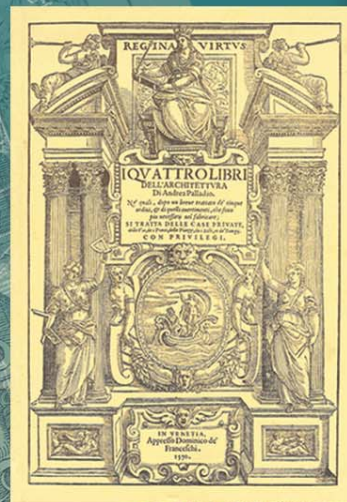




GG 2 LA SEGVENTE

AVIANO AIR BASE DESIGN GUIDE

31ST CIVIL ENGINEER SQUADRON
AVIANO AIR BASE, ITALY



IN VENETIA.
Appresso Domenico de
Franceschi.
1570.

EXECUTIVE SUMMARY

31st Civil Engineer Squadron Mission

“Provide, operate, maintain and protect the installations, infrastructure, facilities, housing, and environment necessary to support aerospace forces having global reach and power, in both peace and war.”

Design Excellence

Design excellence is a collaborative effort that incorporates the needs of the end user of our facilities and services, utilizes the expertise of designers and engineers, and combines those labours with design and construction management. These aspects are synthesized with sound engineering principles for safety and architectural practices for an aesthetically efficient environment under the overriding principle of achieving compatibility.

The Aviano Air Base Design Guide addresses the principles and methods of design, coordination and supervision, and defines their relationships to building construction and maintenance.

Compatibility is defined as “existing in close proximity without affecting each other detrimentally.” From project conception, it is very important to spend time contemplating all of the requirements and how each piece relates to the Aviano community. Establishing an aesthetically pleasing palette to create and unify the canvas of the Aviano Air Base community takes a great deal of effort and cooperation.

The renowned architect, Mies van der Rohe is quoted as saying, “God is in the details,” meaning that design excellence can be achieved by not only considering the more visible aspects of a design, but also through the careful resolution of a project’s details.

This same principle applies to designing, constructing and maintaining where we work and live. Constant improvement, perseverance and attention to detail are the keys to success throughout all works on Aviano Air Base.

Our Vision

Our goal is to build a world class installation by providing mission-ready and customer-focused facilities, professional emergency services, and affordable quality housing for all in a safe, clean environment.

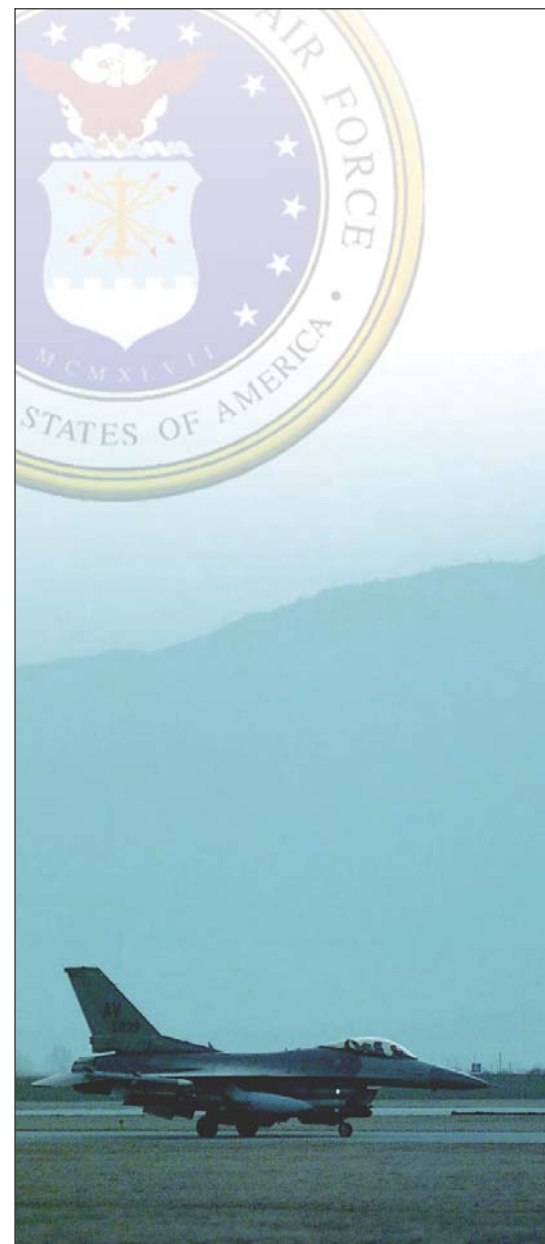


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CHAPTER 1 — HOW TO USE THE GUIDE

1.1.0 Intended Use

The Aviano Air Base Design Standard is intended to be used as a living/working document. It is to be referenced by any person responsible for preparing a request for proposal, programming documents, design and construction contracts, maintenance work orders, construction documents or performing design of any type. These guidelines are concerned with establishing a standard for engineering construction quality as well as for architectural compatibility among the various design elements at Aviano Air Base.

This document is not intended to be an instructional or educational manual for accomplishing “good” design; it is a specific listing of the design standards. These strive to recognize the cultural, environmental, climatic and existing facility conditions peculiar to Aviano AB, and to define the appropriate styles, finishes, materials, equipment and amenities to be used. The design standards aim to achieve both the best facility life-cycle costs and still retain the appropriate environment for people to achieve their highest productivity and efficiency. The purpose of this document is to establish and document installation-specific standards or specifications and to provide a tool for design and construction agencies to consistently apply these standards for various projects at Aviano AB.

The Design Guide has been developed specifically for Aviano Air Base, and is intended to serve as a comprehensive guide and reference manual for all design solutions affecting engineering, exterior visual aspects of the installation and interior standards such as materials, furnishings and finishes. This guide

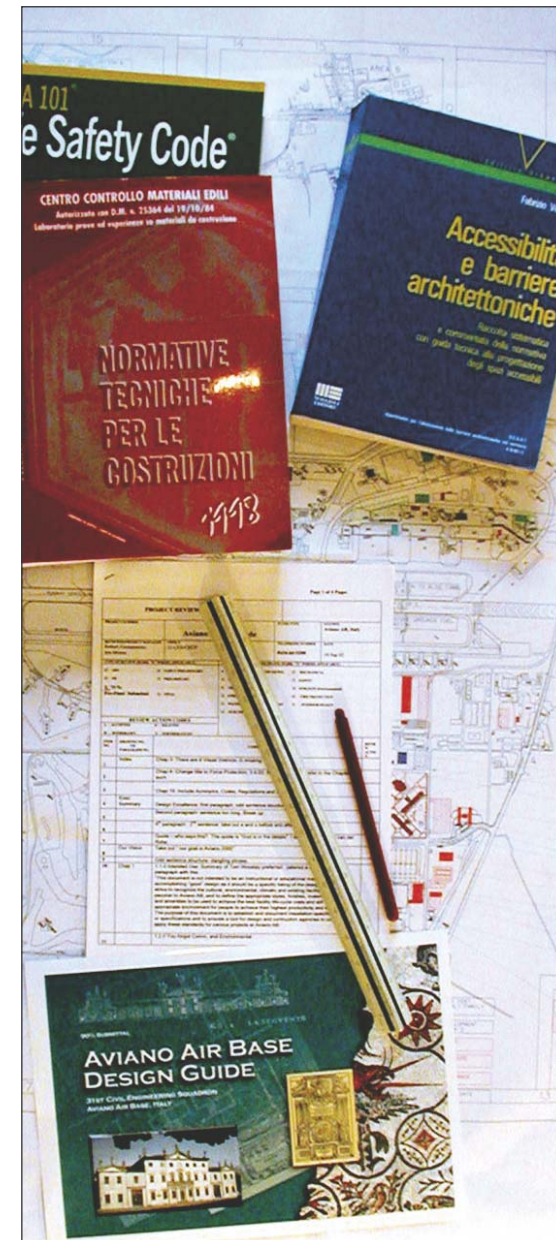
provides basic principles, general concepts, and specific guidelines applicable to the planning and design of new facilities, renovations, and on-going maintenance activities. It is not intended to act as a comprehensive authority on all applicable building codes, regulations, and user requirements. The design professional shall research and comply with all applicable requirements dictated by DoD and Italian authorities and inform the Civil Engineer Squadron of any potential regulatory conflicts in the event that they arise.

1.2.0 Engineering Standards

Standardizing electrical, mechanical, and communication equipment, as well as civil, structural and environmental design requirements will ensure construction of optimal quality. It will also reduce maintenance and replacement parts storage requirements and increase overall energy efficiency.

1.3.0 Architectural Compatibility

The visual environment conveys an image of Aviano Air Base to visitors and assigned personnel. An attractive and harmonious design character and organization of buildings, roads, landscape, lighting, and signs conveys a positive, secure image of Aviano Air Base as well as a professional military community and home base for assigned units. Maintaining the quality of the visual environment is one of the primary goals of the Base design standards.



CHAPTER 1 — HOW TO USE THE GUIDE

The intent of this guide is to set the framework for a base-wide design theme that enhances the efficiency and aesthetic character of Aviano Air Base. While engineering requirements will be standard throughout the base, architectural compatibility standards may be varied slightly (although still related) among the geographically separated areas of the Base.

The architectural standards establish compatibility by:

- 1) Serving as a common resource for Base personnel and consultants.
- 2) Defining the engineering standards, architectural styles and site-related components of Aviano Air Base.
- 3) Providing a single source of information about local climate and regional architectural character, while outlining specific design requirements, materials and site elements.
- 4) Establishing a palette of standards to unify the varied aspects of the visual environment.
- 5) Proposing the use of security design techniques that contribute to Wing's effectiveness during contingency situations.
- 6) Addressing landscape issues and providing a plant list.
- 7) Providing a comprehensive list of code references specific for each design discipline.
- 8) Formulating a set of standards that address environmental issues.

CHAPTER 2 — BASE INFORMATION

2.1.0 Installation Profile

Aviano Air Base is known the world over for its primary mission, which is to support NATO air operations into the Balkan region. Aviano Air Base is the most active composite wing in USAFE. While supporting the mission is its primary focus, quality of life initiatives serve to improve overall morale, increasing capability and effectiveness.

Operations “Deny Flight” and “Decisive Edge,” combined with daily operational requirements have left Aviano Air Base with a legacy of temporary facilities and haphazard development. The Base is transitioning to provide full time operational capability with the NATO-supported Aviano 2000 construction program providing state-of-the-art Air Force operations, maintenance, and support facilities. The architectural design standards draw upon local inspiration to define a style meant to integrate post World War I era structures with later constructed buildings of various architectural styles.

2.2.0 Location

Aviano Air Base is located in the agricultural plains of northeastern Italy near the borders of Austria and Slovenia. It is approximately 50 miles northwest of Venice and 9 miles north of Pordenone. The foothills of the Italian Alps are just to the north of the Base.

2.3.0 Climate

Local climate shall be considered as part of the design process. Low level fog is common from November through April resulting in periods of limited visibility. From May through September, 63 thunderstorms occur on average with a high frequency of lightning strikes. Flooding can be a problem during the rainy season from October through November.

Regional temperatures are relatively mild in the winter and hot and humid in the summer. Uncomfortable extremes are of short duration.

Night winds typically originate from the northeast during the night and from the southwest during the day. The prevailing summer wind is from the north-northeast at approximately 8 knots. Winter wind speeds of 5-10 knots are common. The highest recorded wind speed is 74 knots.

Annual precipitation averages 57 inches. Generally, no more than 25% of precipitation falls during the rainy season months of October and November.

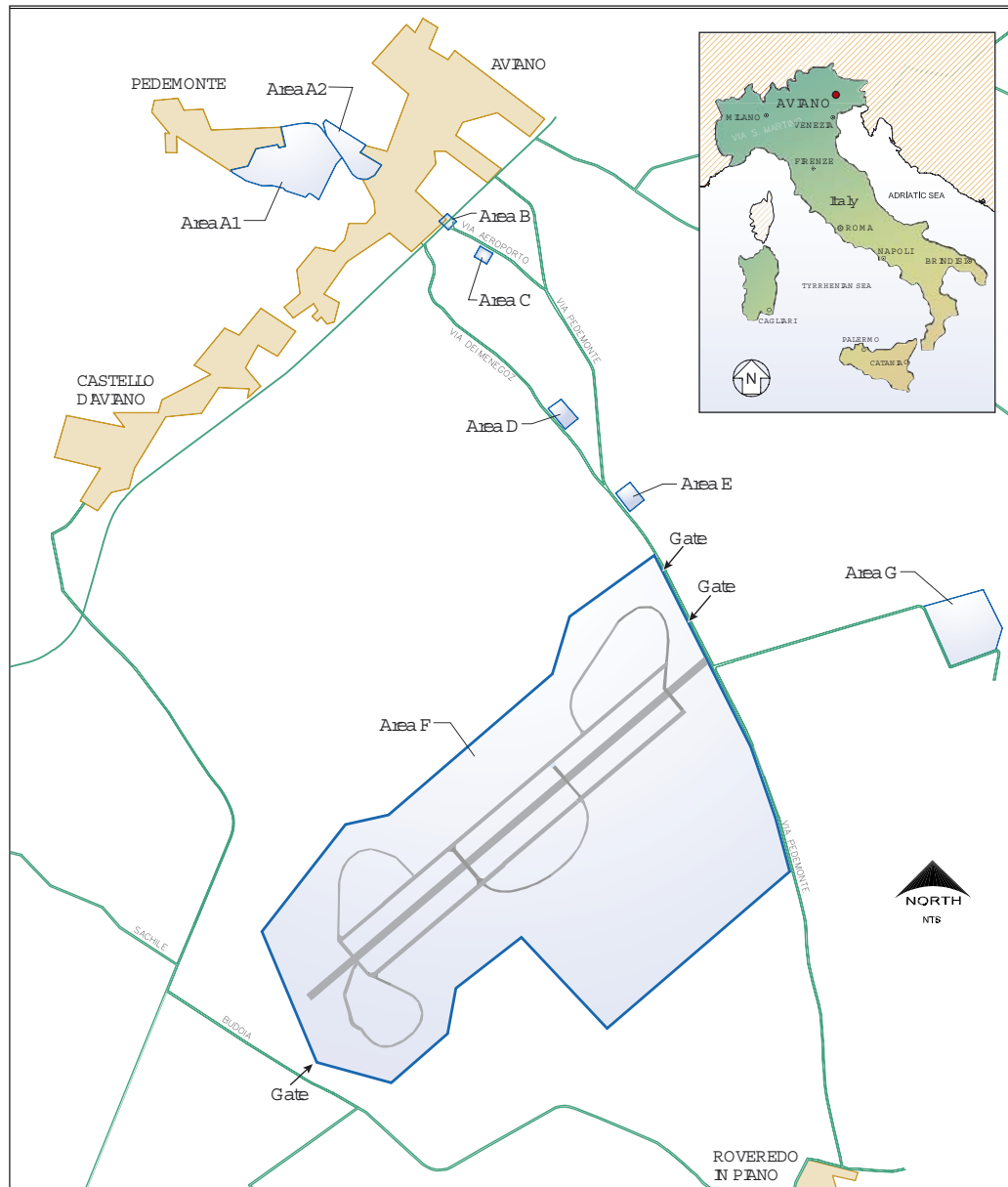
2.4.0 Local Design Character

While local cultural and design practices influence architectural standards for forms, colors and material selection, the facility design must primarily meet user needs. The design standards (site, architectural and landscaping) described in the following chapters unify the overall character of a visual district and unite structures which otherwise would not relate to one another, and visually relate the Base to its local context.



Zulu Loop - Flightline

CHAPTER 2 – BASE INFORMATION



Aviano Air Base location map



Countryside surrounding Aviano Air Base



Aviano's mountain backdrop



Main Square ("piazza") in Aviano

CHAPTER 3 – COMPREHENSIVE PLANNING

3.1.0 General

In the process of ensuring architectural compatibility among buildings, it is often easy to “lose sight of the forest for the trees.” While adjacent buildings may be architecturally compatible, a broader perspective is needed to ensure that facilities are integrated through pedestrian and vehicular circulation systems, that space between structures is effectively utilized, and that the harmony between contiguous development is compatible within the overall development framework of the Base. This can be particularly difficult since some areas within the Base have distinct characters.

Common or unifying elements are essential in order to integrate each of these disconnected areas. Potential friction exists at the peripheries of different districts and care must be taken to inter-relate them in keeping with the comprehensive plan. This section provides an overview of this critical element in the design process. Key aspects of successful planning include preparing for and adhering to the approved Base Comprehensive Plan.

The following can serve as unifying elements throughout the Base and provide opportunities to integrate future development into the larger Comprehensive Plan framework:

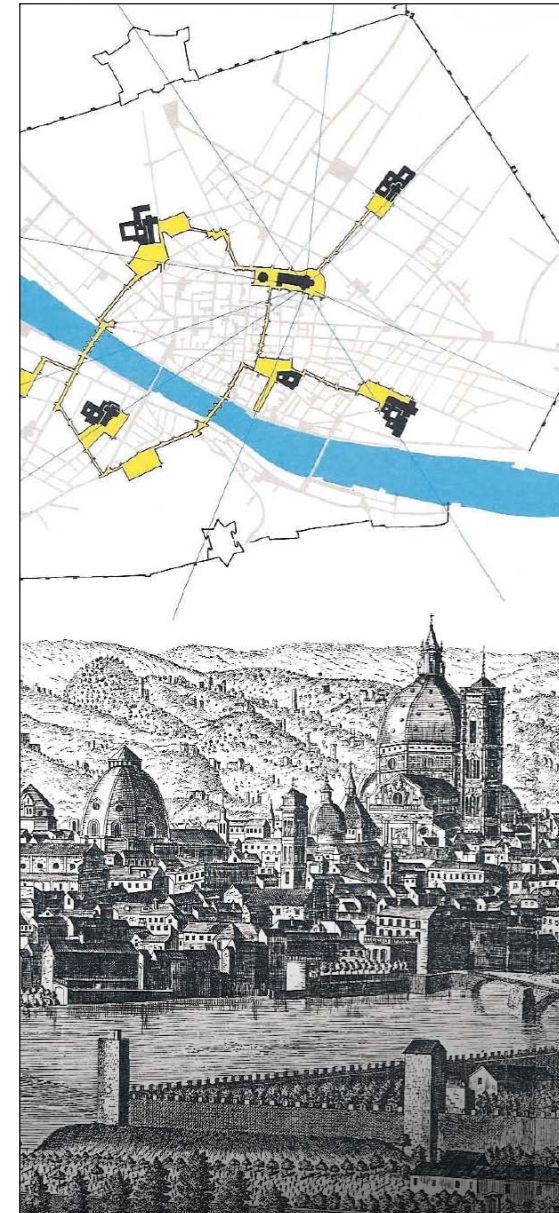
- 1) Edges and Boundaries.
- 2) Routes.
- 3) Open Space.

3.2.0 The Aviano Air Base General Plan

The Aviano Air Base General Plan is the primary document guiding the growth and development of Aviano AB. Its preparation and adoption is required under AFI 32-7062, Air Force Comprehensive Planning. As a component of the General Plan, the Aviano AB Design Guide shall support the goals and objectives articulated in the Plan. Conversely, the General Plan should provide a cohesive vision as the foundation upon which the Design Guide can operate.

As either the General Plan or the Design Guide are updated or changed, concurrent changes should be made in the other document to ensure compatibility. Before a project may be approved for siting, the standards applied in the General Plan will help ensure that proposed projects are compatible with a host of elements, including the following:

- 1) Adjacent land uses.
- 2) Airfield imaginary surfaces.
- 3) Noise and other environmental impact areas.
- 4) Explosive Quantity Distance Arcs.
- 5) Existing and future vehicular and pedestrian circulation systems.
- 6) Existing and future infrastructure locations, sizes, and capacities.
- 7) Future development locations.



Renaissance planning in Florence

CHAPTER 3 – COMPREHENSIVE PLANNING

Additionally, implementing the Aviano AB General Plan will ensure the following:

- 1) New facilities will be sited in their proper functional areas.
- 2) New development will not overburden areas and will be served by adequate infrastructure, including roads and parking.
- 3) Development proposals will permit the expansion of facilities.
- 4) Natural features will be preserved.
- 5) Desirable views will be protected.

3.3.0 Visual Districts

3.3.1 General

The Base is divided into eight visually separated areas or neighborhoods known as “Visual Districts”.

Visual districts are areas where design components create or should create a consistent character. The districts are further defined in terms of land use and functions that share common characteristics.

Each area shall continue to develop its own character with regard to activities, functions, and location, yet relate to the Base as a whole. Architectural elements that establish the physical appearance and character of visual districts and individual buildings are examined in Chapter 8 — Architectural Design.



Extract of Aviano Air Base General Plan

CHAPTER 3 — COMPREHENSIVE PLANNING

The visual districts include Areas A1, A2, C, D, E, F (Flightline), G and Zappala. The following paragraphs briefly describe the functions and services specific to each district.

3.3.2 Visual District A1

Area A1 is a 43-acre area located less than one kilometer from the center of the town of Aviano at the base of the foothills that lead up to Piancavallo Mountain.

This area is visually related to Area A2 but separated by Via Pedemonte — a local public road. A pedestrian underpass connects areas A1 and A2. The main gate entry for Area A1 is located on the East boundary from Via Pedemonte.

Visual District A1 is characterized by primary and secondary activities related to “Community Services.”

Primary activities in this area include the Medical Clinic, Dental Clinic, Family Support Center, Community Activity Center, Chapel, Library, Schools, Education Center, Youth Activity Center, Child Development Center, and the Skills Development Center.

Secondary activities include Base Pool, Laundromat and “Burger King” fast food restaurant.



Area A1, Aerial View



Area A1, Main Entry



Area A1, Base Pool

CHAPTER 3 — COMPREHENSIVE PLANNING

3.3.3 Visual District A2

Area A2 is a 13-acre area in downtown Aviano located directly across the road from Area A1.

Primary activities in this area include Dormitories, Dining Facility, Gymnasium / Fitness Center and Professional Military Education Center (Airman Leadership School).

Secondary Activities include Pre-School, Fire Station, Services Administration, Transportation Management Office (TMO), Scheduled Airline Traffic Office (SATO) and Arts and Crafts.

3.3.4 Visual District C

Area C is a 7-acre site located on the outskirts of Aviano halfway between Areas A1/A2 and Area F.

Primary activities in this area include Civil Engineer administration and workshops.

Secondary activities include Base Supply, communications functions, Project Management Office (PMO), and Self Help.

3.3.5 Visual District D

This district is a 7-acre “Community Recreation” area near area E providing recreational opportunities for Base families in a secluded location.

Primary activities in this area include: Sports Fields, Lodge, and Open Air Pavilion.

Secondary activities in this area include supporting facilities and playing courts.



Area A2, Aerial View



Area A2, Main Entry



Area A2, Building 224

CHAPTER 3 – COMPREHENSIVE PLANNING

3.3.6 Visual District E

Area E, or “16th Air Force Headquarters” is located along the main highway between Areas A1/A2 and Area F (Flightline).

The primary activity is administrative. Secondary activities include telephone and television communications, Security Forces working dog maintenance, and utility support.

3.3.7 Visual District F

The 1,230-acre “Flightline” area, the most southern of the Base areas, is situated on the west side of the main highway between Aviano and Pordenone.

Primary activities in this area include Airfield Operations, Command and Control, Aircraft Maintenance Facilities, and Emergency Services.

Secondary activities include Administration and Logistics.

3.3.8 Visual District G

Area G is a 40-acre isolated munitions storage area located 1.5 km east of the main highway between Aviano and Pordenone.



Area C, Aerial View



Area C, Main Entry



Area C, General View

CHAPTER 3 — COMPREHENSIVE PLANNING

3.3.9 Visual District Zappala

The 220-acre “Zappala” area is located on the south side of the Flightline, within Area F.

Primary activities in this area are supported by “Quality of Life” facilities which include the Commissary, Base Exchange (BX), Temporary Living Facility, Dormitories, Consolidated Club, Theater, Post Office, Child Development Center, with warehousing facilities on the southern perimeter.

Secondary activities include the recreational fields and administrative facilities.

3.4.0 Edges and Boundaries

Edges and boundaries are defined as land areas between different districts. In some instances, edges should be pronounced and a clear demarcation and separation between districts that have incompatible land uses should be emphasized. In other instances, edges offer the opportunity to provide a smooth transition between two districts and can serve to integrate them. Some planning aspects to consider for edges include the following:

- 1) Protect rural edges and open space vistas by maintaining the open character and responding to the colors and vernacular of the agricultural landscape.
- 2) Improve the urban edge by strengthening the relationship between adjacent buildings.



Area D, Recreation Pavilion



Area D, Main Entry



Area D, General View

CHAPTER 3 — COMPREHENSIVE PLANNING

- 3) Improve boundary treatment with buffer planting and introduce local materials into landscape features.
- 4) Creative planning should consider the importance of a visual appraisal to respond to the importance of views in and views out of the site. Refer to Chapter 4 — Security Design for specific restrictions.
- 5) Use edges as buffers between districts that are incompatible. Typical buffering elements may include open space, landscaping, fencing, building or road construction, etc.
- 6) Use edges to ease the transition between districts that are different, but not incompatible. This may be achieved through creating or strengthening corridors (both vehicular and pedestrian/bikeways), maintaining or creating views, landscaping, etc.



Area E, Aerial View

3.5.0 Routes

- 1) Define primary roads by median tree planting and consistent surface materials to create an identifiable character.
- 2) Improve the sense of arrival at gateways and thresholds to visual districts by introducing a change of surface material, low walls and simple planting.



Area E, Main Entry



Area E, General View

CHAPTER 3 — COMPREHENSIVE PLANNING

- 3) Create new focal points and improve existing ones to aid site identity and orientation. Establish a network of pedestrian greenways that follow the primary roadways and link nodes and open spaces. A secondary layer of pedestrian routes should be developed to encourage movement within the visual districts and reduce the need for unnecessary driving and road provision.

3.6.0 Open Space

- 1) Protect existing vegetation.
- 2) Create and improve open space around landmark buildings to establish a setting and a defined building frontage; open space as well as building massing is important to identify and enrich the character of a site.
- 3) Create a network of linked spaces both visually and physically to establish the framework of a campus setting with a rhythm and pattern of streets and spaces.
- 4) All opportunities to define and articulate open spaces need to be exploited — refer to General Plan.

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.



Area F, Aerial View



Area F, Main Entry Gate



"Zappala" Area, BX Commissary

CHAPTER 4 – SECURITY DESIGN

4.1.0 Introduction

The application of all design measures to guard against a range of security threats is the focus of this chapter. This guidance is not all-inclusive nor is it an assessment of the current state of readiness at Aviano Air Base.

The requirements listed in this chapter should be used as guidance to determine appropriate security design on new projects and the renovation of existing facilities.

Refer to the most recent issue of the codes referenced in Chapter 19 — Appendix for complete guidance. Any discrepancies between the guidelines contained in this document and the most current DoD standards shall be brought to the attention of the Base Civil Engineer Squadron for clarification.

4.2.0 Limits on Contractor Work Area

- 1) Works shall be performed only in authorized areas on Aviano AB.
- 2) Access to the work areas shall be authorized by 31 SFS.
- 3) Photography on Base is not allowed unless specific authorization has been approved by SFS; contractor shall make request for authorization to CEC.
- 4) Design Contractors shall be authorized access only to areas where proposed project is located and to Area C (Base Civil Engineer compound).

- 5) Design Contractors shall not have free access to restricted and controlled areas.
- 6) Design Contractors working in restricted areas may be subject to search as outlined in military regulations.
- 7) Base pass application procedure normally requires a minimum of 15 days for processing. Contact 31 CES/CECA for procedure.
- 8) Work to be performed in the vicinity of airfield pavements (runway, taxiways, aprons, etc.), as well as in restricted areas are subject to interruption due to aircraft takeoffs, landing or taxing, and stoppage due to Base exercises.

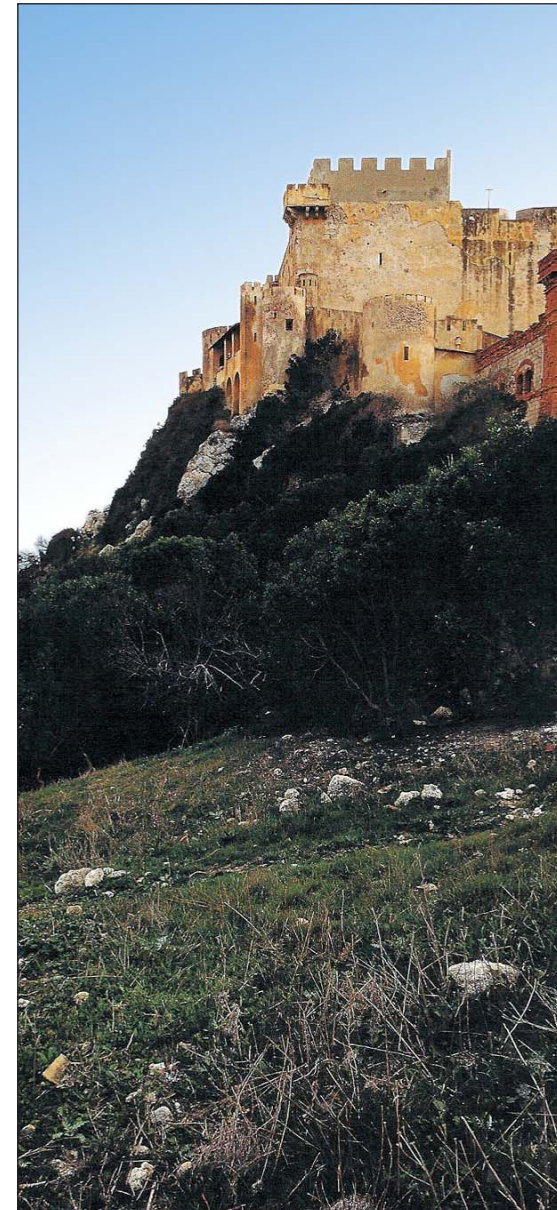
4.3.0 Codes and Regulations

4.3.1 Applicability

Military construction programs must ensure that Antiterrorist/Force Protection (AT/FP) protective features for facilities and installations are included in the planning, design, and execution of major and minor military construction projects.

The Department of Defense Antiterrorism / Force Protection Construction Standards (DoD AT/FP), the United States European Command Operations Order (USEUCOM OPORD) Force Protection Design Standards and the United Facilities Criteria (UFC) may differ slightly but all share the aim of mitigating facility vulnerabilities and protecting US forces. The most stringent of the three documents shall apply.

The Base AT/FP officer will review all facility projects to ensure compliance with the applicable AT/FP standards.



Historical Italian “security design”

CHAPTER 4 — SECURITY DESIGN

The A/E shall incorporate force protection standards into all projects as appropriate and as directed by the Base AT/FP officer from the planning/programming stage. The following requirements are intended to highlight certain critical AT/FP measures that shall be considered throughout the design process.

4.4.0 Sitework Elements

- 1) Eliminate potential hiding places near facilities.
- 2) Provide a clear view around the facilities.
- 3) Locate assets stored on site (but outside of the facility) within view of occupied rooms in the facility.
- 4) Minimize exterior signage indicating location of assets.
- 5) Refer to the most recent issue of referenced codes for minimum facility setback from installation boundaries and general standoff criteria. 31 Civil Engineer Squadron in coordination with 31 Security Forces Squadron shall determine standoff distances in accordance with DoD regulations including those referenced in the Chapter 19 — Appendix.
- 6) Eliminate lines of approach perpendicular to the facility.
- 7) Do not design parking beneath facilities.
- 8) Secure access to power/heat plants, gas mains, water supplies and electrical service.
- 9) Locate public parking within view of occupied rooms.
- 10) Minimize vehicle access points.

4.5.0 Building Elements

- 1) Locate critical assets on the interior of facilities.
- 2) Layout buildings to eliminate hiding places.
- 3) Design circulation to provide unobstructed views of people/vehicles approaching controlled areas.
- 4) Locate assets in or adjacent to spaces occupied 24 hours a day.
- 5) Locate assets away from activities attracting large visitor populations.
- 6) Place mailrooms/orderly rooms on facility perimeters.
- 7) Design recessed windows and openings to limit expanses of glazing.
- 8) Security doors shall meet all specifications relating to the security of the room they access.
- 9) Avoid reentrant corners in building design.
- 10) Locate mechanical rooms on the facility exterior with an exterior entrance only.
- 11) Ventilation ducts may require, depending on room security requirements, sound abatement and installation at wall crossings of insulating duct sections and steel bars.
- 12) All HVAC intakes shall be located 3 meters minimum above surrounding ground/floor level.

4.5.1 Vaults & Armories

Projects requiring Class A and B vaults, strong rooms, and armories must meet specific minimum requirements as defined by Air Force regulations. Contact 31 CES/CECC and 31 SFS for further details.

4.6.0 Perimeter Control

Particular attention must be paid to the streets and pavement at the installation entry gates to assure adequate security, safety and control of visitors.

- 1) Generally, the main gate complexes shall have a minimum of two traffic lanes in each direction to facilitate high traffic volumes during peak periods. Lane width or spacing shall be adequate to ensure the safety of security personnel standing between lanes.
- 2) Approach drives shall be curved to force the reduction of speed of potential aggressor vehicles.
- 3) The guardhouse shall be located on a traffic island between the entry and departure traffic lanes.
- 4) Pull-offs shall be provided to accommodate detained vehicles without blocking normal traffic lanes.
- 5) Vehicle lanes shall be provided in front and behind the guardhouse to allow vehicles to make a U-turn or to cross over from one traffic lane to another under the positive control of the gate guard.
- 6) Each gate at Aviano Air Base must have a positive means of securing the installation perimeter.
- 7) Active barriers are recommended for incorporation into all gate designs.

CHAPTER 4 — SECURITY DESIGN

4.6.1 Barricades and Passive Barriers

- 1) Barricades shall be provided around the guardhouse at entry gates to protect against errant vehicle collision.
- 2) Barricades shall be integrated into the facility design disguised as planters, decorative walls, or sign mounts.
- 3) Passive barriers rely on bulk or mass (without moving parts) to impede vehicular attack. Passive barriers include concrete walls, barriers, earthwork or berms, steel posts, large concrete planters, guardrails, and fences reinforced with vehicle cable barriers.
- 4) While many configurations of barriers and barricades are required by current Force Protection standards, the A/E shall make every effort to integrate them into the design so as not to give an “under siege” impression.

4.6.2 Fencing

Enhanced fencing can provide obscuration and stop moving vehicles. Additional screening material can assist in obscuring sight lines in conjunction with the protective features of the fencing.

- 1) Standard security fencing shall be 1.8 m high.
- 2) Where specified to protect Air Force Assets designated as “Priority A,” the fence shall be 2.1m high with 50cm long outriggers each with 3 strands of barbed wire, for a total height of 2.5m.



Area F, Main Gate Entry, Aerial View

- 3) All fencing shall be anchored to a concrete base. All fencing shall extend downward to the concrete base.
- 4) Reinforced chain-link fencing shall specify aircraft arresting cables (general purpose galvanized, class 2, 6 by 19) to impede vehicular attack. Reinforcing cables shall be placed at a height of 80cm above finished grade. Cable shall be secured to the line posts (connection to be of a strength equal to or greater than the shear strength of the cable).
- 5) Refer to Chapter 14 — Electrical Design, for fencing grounding requirements.
- 6) 31 CES/CEC and 31 SFS may define additional specific requirements on a project by project basis.

4.7.0 Lighting

Lighting alone does not provide security but assists in the monitoring of aggressor activity while enhancing physical safety. Security lighting also provides a psychological deterrent to potential aggression.

- 1) Security lighting system shall be provided for all mission essential, critical and public facilities as required by 31 SFS.
- 2) Coordinate lighting design with the Security Forces Squadron to assess whether potential aggressors can use the proposed lighting to their advantage.

4.7.1 Perimeter and Entry Control Point (ECP) Lighting

Lighting shall be directed outward, with minimal light cast toward security personnel, to facilitate identification of personnel or vehicles accessing the Base. Boundary lighting shall illuminate exterior and interior of the perimeter barriers.

4.7.2 Facility Lighting

The system shall provide sufficient illumination around the entire facility to enable Security Forces personnel to detect intruders from a distance.

4.7.3 Area Lighting

Area lighting illuminates the interior portion of the area under protection. Spot lighting shall be at locations where structures, utilities, or vegetation create shadows or reduced lighting levels shall augment uniform lighting.

4.8.0 Intruder Detection System (IDS)

- 1) “Vindicator” is the Base standard for Intrusion Detection Systems.
- 2) The A/E shall design and coordinate IDS with Security Forces, who shall verify and approve design layout

4.9.0 Protective Landscaping

4.9.1 Landforms

Landforms shall:

- 1) Define boundaries of property.
- 2) Provide a barricade/obstacle to moving vehicles.
- 3) Hinder aggressor movement on foot.
- 4) Provide obscuration of sightlines by construction or a combination of vegetation and construction elements.
- 5) Be located at appropriate standoff distances from assets where practicable.

4.9.2 Berms

Rolling terrain and mounding irregularities shall be utilized wherever practical to provide obstacles/drop-off to deter vehicular movement. Berms should be designed at a slope of 1:1 or steeper with a minimum rise of 1 m to deter vehicle movement. Slopes must be stabilized. Retaining walls may be incorporated into the berms for armoring and stabilization.

4.9.3 Ditches, Swales and Depressions

- 1) Ditches shall be constructed at a slope of



Barricades shall be integrated into facility design.

1:5 for rock lined slopes or 1:2.5 for non-rock lined slopes.

- 2) Integrate slopes and berms with ditches for greater effect

4.9.4 Protective Planting

- 1) Protective planting may be used to deter hiding, hinder site access, define boundaries and standoff zones or obscure lines of sight.
- 2) Careful plant selection will ensure the use of materials that can fulfill the required protective measures. Plantings shall be low maintenance.
- 3) Refer to Chapter 6 — Landscape Design for plant selection lists and recommendations.

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 5 — SITE DESIGN

5.1.0 Site Development

5.1.1 General

Site planning is one of the more important elements of any project design. It is a multi-disciplinary art requiring the involvement of community planners, landscape architects, architects, environmental scientists, civil, mechanical, and electrical engineers. To achieve the optimum site plan, each discipline must work in concert with the other. The following requirements must be evaluated to ensure that the best solution is selected:

5.1.2 Site Analysis

- 1) New facilities shall be sited in accordance with Chapter 3 — Comprehensive Planning.
- 2) Planned site and building elements shall develop a sense of order, arrival, orientation, and community open spaces.
- 3) Site facilities in relationship to one another to create outdoor spaces.
- 4) Siting shall achieve spatial balance and scale through thoughtful placement and arrangement of structures, landscaping, and landforms.
- 5) Because land is sparse for development opportunities, every attempt shall be made to develop multi-storied structures where feasible.
- 6) Siting of facilities shall take in to consideration the possibility of future expansion

5.1.3 Siting Requirements

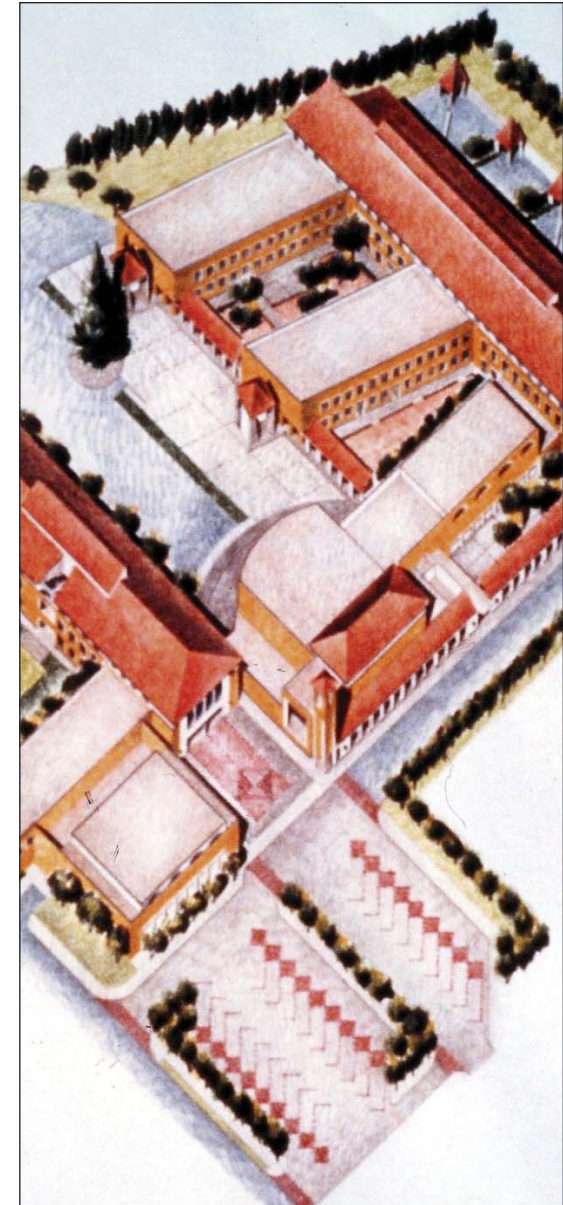
- 1) Site buildings to take advantage of the positive features of the location.
- 2) Provide protection from undesirable winds, glare, and excessive sun.
- 3) Orient operable windows to take advantage of seasonal breezes to maximize potential passive cooling.
- 4) Building siting shall capitalize on solar gain and prevailing winds for passive heating and cooling.
- 5) Building placement and orientation shall take advantage of interesting or scenic views where possible.
- 6) Siting shall strive to create a clear sense of arrival for newcomers.
- 7) Refer to Chapter 4 — Security Design for further requirements.

5.2.0 Circulation Systems

5.2.1 Pedestrian Systems

Due to the relatively narrow roadways, tight or nonexistent shoulders, and the presence of barrier-creating drainage ditches, Aviano does not present itself as a “pedestrian friendly” base. Efforts to include elements that change this image shall be incorporated into every design.

Pedestrian circulation is of critical importance at Aviano Air Base due to its compact nature and the fact that many people do not have cars. Site development



DoDD's School - Area A1

CHAPTER 5 – SITE DESIGN

needs shall be thoroughly assessed with high value placed on pedestrian circulation, safety, and accessibility. The following elements reinforce these values:

- 1) Include sidewalks, squares, courtyards and covered walkways as significant elements of any new project.
- 2) Accommodate safe pedestrian circulation and accessibility throughout the site.
- 3) Extend circulation routes to connect with adjacent sites and facilities as needed.
- 4) Jogging/biking trails shall be integrated with pedestrian circulation where appropriate.
- 5) All building entries shall be linked with the pedestrian circulation network on Base.
- 6) Internal courtyard designs should allow access for pedestrians from the exterior of the facility without having to enter the building.
- 7) Incorporate small nodes with benches along pedestrian paths where people can gather for socialization.
- 8) On low volume streets, arrange pedestrian sidewalks and bicycle paths to run parallel with the road.
- 9) On high volume streets, pedestrian sidewalks should lead into facility compounds, avoiding pedestrian/vehicle conflicts.
- 10) Sidewalks shall be provided wherever pedestrian traffic occurs. Width shall be adequate to accommodate anticipated pedestrian flow.
- 11) As a general rule, walkways to building entrances shall be a minimum of 2.5 meters wide. All other sidewalks shall be 1.5 to 1.8 meters wide or greater if expected pedestrian flow dictates. Refer to paragraphs 5.2.2, 5.2.3 & 5.2.4.
- 12) Sidewalks shall be designed to comply with accessibility standards. Provide ramps with curb cuts at road intersections. Differentiate transition between sidewalk and roadway using textured pavements that warn visually impaired pedestrians of the potential conflict between pedestrians and vehicles.
- 13) Walks in special areas (building entrances, plazas, sidewalk intersections, etc.) shall be paved with precast concrete pavers in a variety of patterns.
- 14) Use concrete pavers where walks abut facility entrances and at crosswalks in front of facilities.

5.2.2 Primary Walks

Network segments carry the highest volumes of pedestrian traffic between major activity centers or traffic generators. Primary walkways are generally characterized by hard surface paving, high lighting levels, pedestrian amenities such as benches and water fountains, and refinement of landscape features along the walkway. Primary walks shall have a minimum width of 1.8 meters and a standard broomed finish. Primary walks and jogging/bike paths shall be designed to accommodate loads and dimensions of maintenance service vehicles.



Recreational path



Typical Italian sidewalk with stone pavers and planting

5.2.3 Secondary Walks

Moderate volume segments of the network provide connection between activity centers. Secondary walkways are generally characterized by hard surface paving, lower lighting levels, and fewer amenities or landscape features along the walkway. Secondary walks shall have a minimum width of 1.5 meters and a standard broomed finish. An additional 30cm of width shall be provided wherever walks are adjacent to a curb or wherever obstacles encroach on the walk.

5.2.4 Tertiary Walks or Recreational Paths

Leisure and recreational walkways are less direct and more scenic in character. Tertiary walkways are generally characterized by soft surface paving, minimal illumination if any, and a natural landscape character along the pathway. Minimum width shall be 1.5 meters.

5.2.5 Passive Outdoor Areas

- 1) Plan all facility developments to provide outdoor passive and/or active use areas as dictated by the facility program requirements.
- 2) Design pavilions to become an integral part of the complex.
- 3) Pavilions shall complement the architectural style and materials of adjacent buildings.
- 4) Enhance outdoor use areas with amenities such as barbecue grills, tables, benches, lighting and landscaping that are appropriate to the facility use.

- 5) Designated smoking areas shall be located away from main entrances and major pedestrian paths.

5.2.6 Bicycle Systems

- 1) Bicycle paths shall be provided wherever possible and shall be coordinated with other pedestrian/ bicycle paths abutting the project site.
- 2) The bicycle path system shall be isolated from motorized vehicles wherever possible. Existing roadways should be widened and striped to designate a dedicated bike lane where space does not allow a separate route.
- 3) In some areas, bike paths can be successfully combined with jogging paths. A two-meter wide asphalt bike path should be routed along a finely crushed limestone jogging path of equal width to create a combined-use path.
- 4) Careful attention must be paid to curb cuts where bike paths intersect with walks or roadways to insure smooth transitions.

5.2.7 Vehicular Systems

- 1) Provide access to facilities from secondary streets to reduce congestion associated with main streets.
- 2) Where possible, divide main entrances with landscaped traffic medians between entry and exit lanes.
- 3) Many roadways on Base do not have curbs and gutters. Install curbs and gutters on all roadways within the built-up areas of the Base.

- 4) A/E's shall coordinate road design with 31 CES for site specific roadway design parameters (for fuel trucks, K-loaders, oversized transports, etc.).

5.2.8 Base Shuttle Bus Service

- 1) Designers shall site shelters and walks to serve personnel that utilize the Base shuttle bus service.
- 2) Refer to Section 5.6.3 for bus shelter design requirements.
- 3) Coordinate the quantity and location of bus shelters with the Base Planner.

5.2.9 Emergency Vehicle Access

- 1) Site buildings a minimum of 15 meters laterally from the closest adjacent building when possible. Refer to Chapter 4 — Security Design, for additional requirements.
- 2) Obtain width, weight, and turning radii of emergency vehicles and coordinate fire protection vehicle access with Base Fire Department and Safety Office.

5.2.10 Service Access

- 1) Design access streets and parking areas to accommodate loads and dimensions of service vehicles.
- 2) Walkways connecting interior courts between buildings shall be at least 2.5 meters wide and shall be designed to withstand loads of medium weight service vehicles.

- 3) Consider treating the walkways with interlocking pavers to minimize the negative visual impact of wider access routes.
- 4) Use materials such as grasscrete type pavers in areas that provide access to infrequent service vehicles.
- 5) Separate delivery vehicle entrances from POV parking areas.
- 6) Storage yards, alleys, loading zones and service areas containing dumpsters shall be located away from pedestrian ways and screened from view.
- 7) Site utility meters, connections, dumpsters, chillers, above ground fuel tanks, post indicator valves, well pumps, etc. within screened utility/mechanical yards located adjacent to the mechanical and boiler rooms.

5.2.11 Intersections

- 1) Bring intersecting travelways together at or near a 90-degree angle.
- 2) Establish corner sight triangles and keep them clear.
- 3) Planting materials shall not obstruct lines of vision at intersections. Planting material setbacks shall conform to standard traffic design codes. Refer to Chapter 6 — Landscape Design for additional requirements.
- 4) Avoid multi-leg intersections or driveways creating multi-leg intersections: four legs maximum.
- 5) Clearly define the travelway with paint, curbing, etc.

- 6) Parking lot access shall be located not closer than 20 meters from street intersections.
- 7) Avoid having pedestrians cross traffic lanes to get from parking lots to buildings - otherwise provide safe crosswalks.
- 8) Design parking layouts so that maneuvering in and out of spaces does not interfere with the ingress/egress to or from the street.
- 9) Be sure right-of-way is clearly assigned where traffic lanes cross.

5.3.0 Vehicle Parking

5.3.1 General

Automobile parking is a dominant visual element in many parts of the Base. Vehicle parking areas consume more site space and impact the physical environment more than any other site feature. Paving increases storm water runoff, results in increased reflected and absorbed radiation, and raises the ambient temperature of the surrounding area. The following guidelines shall be implemented to mitigate some of these noxious effects:

- 1) Parking lots shall primarily be surfaced with asphalt.
- 2) Provide precast pavers at pedestrian crosswalks. Consider “humping” the pavers for a traffic calming effect.
- 3) Break up vast parking lots by integrating landscape islands, berms, and paving crosswalks.

- 4) Trees shall be planted in the islands between rows of parking and at suitable intervals between groups of parking stalls to provide shade and visually break up the expanse of paved surface.
- 5) Properly locate traffic islands to provide safe pedestrian circulation.

5.3.2 Perimeters

A common problem observed in many hard-surfaced areas is the lack of edge definition. Undefined traffic flow patterns are a significant visual liability and safety hazard in some areas of Aviano Air Base.

Parking lot design shall include the following:

- 1) Vehicular functional separations shall be clearly defined.
- 2) Points of ingress and egress shall be adequately defined and marked with proper signage.
- 3) Provide visually reinforced edges and transitional landscaped areas between parking lots and adjacent buildings.

5.3.3 Design and Dimensions

Parking lots should be designed based on the following criteria:

- 1) Provide multi-level parking structures where possible. These structures shall conform to Base architectural standards.
- 2) Consider potential expansions to accommodate mission or functional changes.

CHAPTER 5 — SITE DESIGN

- 3) Avoid dead-end parking lots that exceed 20 spaces. Two drives access (one ingress and one egress minimum) shall be provided for lots exceeding 20 spaces.
- 4) The perimeter edges of all parking lots, access drives, and interior "islands" and "peninsulas" shall be physically separated from adjacent surfaces by a concrete curb.
- 5) Curbs shall be precast concrete with a vertical face approximately 15cm high. The use of "rolled" or similar type curbs shall be implemented only with approval of the Base Planner.
- 6) Typical parking stall size shall be 2.7m x 6m.
- 7) Compact parking stall size shall be 2.5m x 6m.
- 8) 90-degree spaces and two-way traffic aisles shall typically be used where space allows.
- 9) Loading dock parking shall be a minimum of 3 m x 10.5 m and 4.3m high.
- 10) One-way drives with no parking shall be a minimum of 3.6 m wide.
- 11) Two-way drives with no parking shall be a minimum of 5.5m to 7.3m wide.
- 12) Recommended pavement slope shall be between 1 to 5 percent.
- 13) Walks adjacent to parking areas with overhanging car bumpers shall maintain 1.8m minimum.
- 14) For initial planning purposes, a figure of 37 gross square meters per authorized space should be used. This figure will include parking, drives and walks.

- 15) Parking lots shall be located to maximize sharing with other related facilities.
- 16) Parking lot layouts that promote cross-traffic between parallel streets should be avoided for safety reasons.
- 17) On street, head-in parking that would require backing of a vehicle onto any street shall not be permitted.

5.3.4 Privately Owned Vehicle (POV) Parking

The following standards apply for POV parking space allocation:

- 1) Headquarters and administrative facilities: 50% of assigned personnel with daily space need.
- 2) Maintenance Shops/Hangars: 38% of the largest shift.
- 3) Refer to Chapter 19 — Appendix for guidance on quantities and types of parking for the various facility types.

5.3.5 Motorcycle Parking

Spaces dedicated to motorcycle parking shall be made of concrete to withstand the force of standpoint loading.

5.3.6 Bicycle Parking

The use of bicycles is encouraged on Base as a means of promoting activity beneficial to personal health and reducing unnecessary automobile traffic.

- 1) Provide bicycle racks at all facilities based on the requirements outlined in Section 5.6.8.

- 2) Bicycle parking shall be located adjacent to sidewalks.

5.3.7 Parking for Disabled Persons

- 1) Provide handicap parking spaces in accordance with the Uniform Federal Accessibility Standards (UFAS) and the Americans with Disabilities Act Architectural Guidelines (ADAAG).
- 2) Locate these parking spaces to provide the most convenient access to the building entry.

5.4.0 Exterior Lighting

Lighting shall be designed to ensure safety at night and provide a series of visually attractive elements that are coordinated with architecture and site furnishings. Locate the lighting system to reinforce circulation patterns, illuminate traffic conditions, and provide visual orientation to help pedestrians and drivers find their way at night.

5.4.1 General

- 1) Consider operational and maintenance costs in the selection of suitable lighting fixtures. All light fixtures shall be energy efficient.
- 2) External light systems shall be installed with crepuscular and timer switches.

5.4.2 Pedestrian Lighting

- 1) Lighting for primary walkways and squares should be supplied by fixtures mounted at an average height of between 4 to 5 meters.
- 2) Light fixtures shall be vandal proof.

CHAPTER 5 – SITE DESIGN

- 3) Low wattage fixtures mounted below eye-level shall be installed at stairways and secondary pathways.

5.4.3 Special Purpose Lighting

Provide fixtures as required for recreational, commercial, and industrial applications

5.4.4 Feature Lighting

- 1) Provide accent lighting for static displays, monumental building facades, flagpoles and fountains.
- 2) Arcade and building lighting shall be wall-mounted wherever possible.

5.4.5 Security Lighting

Refer to Chapter 4 — Security Design for additional requirements.

5.5.0 Grading

5.5.1 Ground Finished Floor Elevation

Aviano Air Base is located on an essentially flat plain. There are, however, many opportunities to incorporate creative grading techniques for aesthetic as well as security reasons. The landscape architect, architect and civil engineer must work closely together to achieve the optimal design results. A design approach that seeks only to “level the site” often results in a barren visual effect that may have drainage problems and lacks visual interest.

Establishing the finished floor elevation (FFE) of buildings is one of the more important aspects of site

planning, and must be considered early in the design process to ensure that all professional disciplines coordinate their designs. The FFE affects site grading, cut and fill, visual impact of the facility and interior-exterior transitions. The FFE may also have a significant impact on the landscape architect’s ability to effectively introduce plant materials into the new environment.

5.5.2 General Grading

Grade the site to achieve an orderly transition from the point where personnel enter the site by automobile or on foot to the point where they arrive at the ground floor elevation.

5.5.3 Storm Drainage

- 1) Provide underground storm drainage for each complex depending on the geographic location and the availability of nearby subsurface storm drains.
- 2) All site water must either be intercepted in drop inlet structures or be designed to drop directly into a subsurface system. As a minimum, divert surface water to an underground system to a point where it is discharged into above ground storm drains.
- 3) Provide for retention and erosion prevention.
- 4) Provide for drop inlets as necessary to intercept surface runoff and prevent walkways from being flooded.
- 5) All new parking lot drainage must go to an oil water separator, and then to a dry well or collection ditch.

- 6) Connection of any storm water drain/treatment system to the sanitary sewer system is not allowed under any circumstances.

5.5.4 Landforms

The landscape architect and civil engineer must work together to use landforms to screen undesirable views.

- 1) Use landforms such as mounds, berms, and swales in conjunction with landscape plant materials to obscure parking areas and utilities.
- 2) Incorporate landforms to enhance drainage structures or surface water retention areas.
- 3) Use landforms as a means to add interest and diversity to the project or to perform a particular function (outdoor amphitheater or gathering space) or to separate functions (official and recreational).
- 4) Earth berms are acceptable for use as screening of parking, trash dumpsters etc. Berms shall have a minimum height of 90cm. They shall have a maximum slope of 3:1 and a minimum slope of 5:1.

5.6.0 Site Furnishings

Site furnishings shall be incorporated into gathering areas or pedestrian thoroughfares as extensions of building elements (e.g. Planter walls and steps should double as outdoor seating where possible).

CHAPTER 5 — SITE DESIGN

5.6.1 Fences, Screens, and Walls

- 1) Screening techniques shall be used to block undesirable views, to separate incompatible land uses, and to increase privacy.
- 2) Fences should be minimally introduced in pedestrian areas except where needed to screen objectionable elements.
- 3) Suitable materials for fences include poured concrete, plastered concrete block, architectural metal and chain-link. Coordinate design with CE for required fence type for specific facilities and functions.

5.6.2 Paving

- 1) Brick or concrete pavers should be introduced at the entrance to “important” buildings, at pedestrian crossings (where compatible with speed of vehicles), curb cuts, crosswalks in parking lots, speed bumps and in squares and courtyards.
- 2) Pavers shall be introduced in a variety of compatible patterns throughout the Base to provide visual interest.

5.6.3 Bus Shelters

- 1) Bus shelters shall conform to existing Base standard design.
- 2) Minimum bus stop shelter accessories are bench, trash receptacle, smoke urn, route map and schedule, and vandal proof ceiling light.
- 3) Provide a 1.5 m minimum setback from the road edge, sidewalk access, and a paved floor

sloped toward the street with handicap curb cut to the street.

5.6.4 Picnic Shelters

- 1) Picnic shelters should reflect the architectural character of the surrounding Italian architecture.
- 2) All gazebos require CES review.
- 3) Wood gazebos are not permitted.

5.6.5 Static Displays

Static displays shall be reserved for air parks, prominent intersections, or Base entrances.

5.6.6 Vending Machines

- 1) Vending machines for food and newspapers shall be placed together in sheltered spaces within commercial areas.
- 2) Screen vending machines from view with walls or similar elements.

5.6.7 Seating

- 1) Provide minimal seating at all primary building entries, in non-duty areas, auto drop-off zones, along pedestrian ways and in squares and courtyards.
- 2) Incorporate seating into architectural design features (i.e., raised planting beds and architectural walls).
- 3) Provide a minimum of 30 cm of seating for every 21 square meters of plaza space. Seating depth shall be a minimum of 30 cm.



Paving pattern in a dorm courtyard



Base standard bus shelter



Base standard bench

CHAPTER 5 – SITE DESIGN

- 4) Benches shall be precast concrete with a back and conform to the current Base standard established by CES.
- 5) Seating requirements maybe met by exterior stairs and/or seating walls.

5.6.8 Bicycle Racks

- 1) Provide anchored racks to which bicycles can be secured.
- 2) Provide all bicycle parking on concrete or paver surfaces.
- 3) Locate racks away from the building entrances, adjacent to sidewalks, and at the sides of buildings where possible. Do not locate bicycle parking directly within automobile parking lots.

5.6.9 Bollards

- 1) Bollards shall be used to protect and separate pedestrians from vehicular traffic where necessary.
- 2) Bollards shall be used to protect vulnerable mechanical equipment (e.g. Fire hydrants, attached kitchen equipment, exposed service equipment) from damage.
- 3) Refer to Chapter 4 — Security Design for additional applications and requirements.

5.6.10 Trash Receptacles

- 1) Standard trash receptacles shall be located near gathering spaces, eating facilities, bus stops, squares and courtyards. Location is subject to approval by Base Security Forces.

- 2) Dumpsters shall be located out of pedestrian way wherever possible. They shall be located within a screened enclosure equipped with gate and shall ensure adequate access for service trucks.

5.6.11 Planters

- 1) Moveable planters shall not be used except as decorative features incorporated into the design of building entrances.
- 2) Planters shall be of uniform design.
- 3) Permanently set oversized planters constructed of cast concrete are preferable to and shall be used in lieu of bollards where space permits.

5.6.12 Tree Grates

- 1) Tree grates shall be incorporated into paved areas having heavy pedestrian traffic.
- 2) Tree pits in sandset or poured pedestrian pavement areas shall be defined by concrete edging.
- 3) The opening shall be a minimum of 75 cm in diameter and shall be proportional to specific tree species selected.

References

Chapter 6 — Landscape Design for related requirements.

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.



Base standard bicycle rack



Base standard bollard design



Base standard trash receptacle

CHAPTER 6 — LANDSCAPE DESIGN

6.1.0 Introduction

Site development principles for Aviano Air Base shall take into consideration the characteristics and value of the indigenous landscape in the region combined with responsible selection and implementation of new planting materials that will integrate and improve the existing landscape features. Landscape plant materials shall be used to compliment architectural style, provide a transition to human scale, define open space, frame good views, and screen undesirable features. The materials shall also provide shade for outdoor use areas, compliment AT/FP requirements, and address energy conservation.

Existing trees and vegetation shall be preserved and protected and/or relocated where feasible and appropriate. Utilization of existing trees can only be accomplished through the effective siting of new facilities and the careful and site sensitive approach to establishing finish floor elevations and related grading requirements.

New landscape plant materials shall be selected based on the approved plant list for Aviano Air Base (provided in section 6.8.0 of this document) in conjunction with plants available from and recommended by local nurseries. The plant palette shall compliment the diverse landscape of the region and bring unity and order to the newly developed areas.

6.2.0 General Guidelines

The species of each plant generally shall be carefully selected to satisfy design intent without developing significant pruning and/or other high-maintenance practices. Landscape schemes shall be developed

in such a way that they maximize each plant's features while minimizing the frequency of required maintenance. The following guidelines shall be considered:

- 1) Raised planting beds shall be used in lieu of at-grade planting beds to reduce litter removal problems associated with blowing site debris and to reduce maintenance by restricting the invasive nature of the local grass.
- 2) Use flowering shrubs and/or ornamental trees in the raised planter beds to provide interest at entry accent plantings when possible.
- 3) In addition, raised planter wall heights shall be designed to serve as sitting areas where required.
- 4) In general, avoid scattered or random planting in a lawn area. Plants shall be located as massing in groups or in a prepared planting bed. Groups or clusters of plant materials shall be physically connected to avoid wasted space between them. Wasted space causes the composition to appear disjointed and increases maintenance requirements.
- 5) Determine plant spacing according to the mature spread of the plant rather than the size when first planted. Avoid over-planting, but allow separate plants to grow together and read as a mass instead of single shrubs. Trimming or pruning shall follow the natural line and form of the plant to reduce maintenance; avoid severely structured plant shapes.
- 6) Plant materials with invasive root systems shall not be used near buildings or within seven meters



Classical Italian landscape design

CHAPTER 6 – LANDSCAPE DESIGN

of any paved surface, nor adjacent to any utility or sewer lines (sanitary or storm).

- 7) Compact shrubbery and accent specimen trees higher than 45 cm shall not be planted within 2 meters of street curbs or shoulders.
- 8) Do not use trees with large flowers, fruit, or plant materials that drip sap where branches may overhang parking lots, walks or other paved surfaces.
- 9) Balance the use of evergreen and deciduous plant materials. Evergreens provide green color year-round and are effective visual screens. Evergreens can also serve as a contrasting backdrop for other specimen plants. Deciduous plants add excitement and dynamic interest to a composition by indicating the change of seasons.
- 10) The color of flowers, berries, and fall foliage of the plant materials selected shall not clash with the color of a building or the other plants in the same composition. When choosing a blooming plant for color accent, remember that for most of the year the plant will not bloom. Therefore, the plant must have sufficient character when not in bloom to justify its use.

6.3.0 Landscape Development Zones

The landscape theme for Aviano Air Base shall be the “mini-oasis.” The mini-oasis landscape design concept includes the separation of landscaped areas based on visual and functional importance, as well as maintenance and water requirements.

Typically, three landscape development zones are created for an installation to define areas of differing visual significance and importance as well as patterns of vehicular and pedestrian circulation. In the conceptual phase of the landscape design process, each project shall be organized into these three areas or zones, which are defined as follows:

- 1) The primary zone is an area that is highly significant to the perceived visual quality and image of an installation such as main gates, static displays, community centers, and main roadways. In the primary zone, plant density relative water use and maintenance requirements maybe higher than in the rest of the project site.
- 2) Secondary zones or transition areas include most of the remaining areas of the installation. These areas mark the conversion from the more lush, green nature of the primary zones to the more natural tertiary zones. They serve as transitions between the highly developed or visually prominent spaces and the industrial facilities. Maintenance and water usage shall be minimal but slightly higher than for the tertiary zone.
- 3) Tertiary zones are those areas requiring little to no long-term landscape development, such as the flightline, security areas, less public spaces along perimeter fencing, storage yards, tanks farms, and undeveloped land outside of the cantonment area. The tertiary zones are limited to those parts of the site where very little “people-use” is expected. These areas include the outer zones of parking lots, low-visibility areas, and the fringes of a project. In the tertiary zone, plants shall be chosen for their hardiness and



Example of Primary Zone planting



Example of Secondary Zone planting



Example of Tertiary Zone planting

CHAPTER 6 — LANDSCAPE DESIGN

low-water usage characteristics, and the ground plane is either left natural or is covered with inert groundcover; very little or no maintenance shall be required.

Within the various emerging landscaping development zones at Aviano Air Base, several common situations exist that need to be treated or solved with appropriate landscape design:

- 1) Individual hardscapes such as building entries, screens and fences shall attempt to blend with their surrounding landscape and not be treated as stand-alone constructions. In some cases the selection of low to medium shrubs is a more appropriate screening solution (visually, economically) than the use of screen walls.
- 2) Appropriate landscape elements and plantings shall be used to soften masonry enclosures, screen utilities and to highlight main building entries.

6.4.0 Street Plantings

Primary vehicular intersections and major roads demand special consideration as major focal points of the base, gaining prominence as the primary access routes through the base, while secondary and tertiary streets have a decreased level of visibility and importance. The significance of various streets shall be considered and addressed when designing plantings to enhance spatial and sequential experience as the user moves through the base.

6.4.1 Primary Streets

Primary roads, which comprise the installation skeletal system, carry the greatest amount of traffic and set the dominant visual image of the installation. They carry continuous traffic, are lighted, divide major land uses and collect all other roadways.

- 1) Main vehicular roads shall be defined by landscaping. Rows of large, long-lived trees shall be planted along each side of primary streets to emphasize visual effect and channel views.
- 2) Main intersections shall be appropriately landscaped.
- 3) Sidewalks shall be separated from primary roads by a planting strip at least 1.5 meters wide wherever possible.
- 4) Medians, street lighting, signage and plantings shall be employed to reinforce the importance of the roadway.
- 5) A stopping sight distance of 110 meters shall be maintained along the roadway.
- 6) Tree spacing shall depend on the type of tree, and be located a minimum of 2 meters from the back of the curb. Nominal spacing variations may occur to maintain rhythm while avoiding curb cuts, utilities and existing trees.
- 7) A tree with a minimum 8cm caliper and a clear trunk of 2.5 to 3 meters shall be used in the new planting.
- 8) Trees shall be selected from the approved list as provided in section 6.8.0 of this document.

6.4.2 Secondary Streets

Secondary roads provide the network of access between primary roads and destinations for commercial and most organizational traffic on the installation. They have mostly intermittent and stop-and-go traffic, penetrate land uses and deliver the most parking areas. Secondary streets, unlike the primary streets, have less traffic on them therefore require less emphasis.

- 1) Sidewalks shall be separated from secondary roads by a planting strip of grass wherever possible.
- 2) Street lighting, signage and planting shall reflect the secondary nature of the roadway and the character of the land use area contained within.
- 3) A minimum 85-meter sight distance shall be maintained for all traffic signage.
- 4) Typical tree spacing shall depend on type of tree and canopy spread. Nominal spacing variation may occur to maintain rhythm while avoiding obstacles. Newly planted trees shall have a minimum of 6cm caliper and have a clear trunk of 2 meters.
- 5) Trees shall be selected from the approved list as provided in section 6.8.0 of this document

6.4.3 Tertiary Streets

- 1) Street trees planted along tertiary streets shall be planted in three or more tree groupings planted on 8-18 meters on center.

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- 2) Spacing between groupings shall not exceed 35 meters except to avoid curb cuts, drainage ditches, or utilities.
- 3) A setback of 3 meters from the road edge shall be maintained.
- 4) Trees shall have a minimum caliper of 5 cm and a clear trunk of 2 meters.
- 5) Trees shall be selected from the approved list as provided in section 6.8.0 of this document.

6.5.0 Foundation Plantings

Foundation plantings are those which occur along building entrances and walls. Their purpose is to visually integrate the structure into the landscape or to accent and/or soften special areas such as building entrances.

Foundation plantings are plantings next to or within 5 meters of a building wall, and may include trees, shrubs, groundcover and/or seasonal annual plantings used solely or in combination.

The selection of appropriate foundation planting materials depends largely on the building facade. All structures should incorporate some level of foundation plantings.

- 1) Plantings shall be concentrated in planting beds ranging in height from 2 meters for small trees to 1 meter and less for shrubs.
- 2) A hierarchy of plant types, heights and textures should be used to frame and enhance the building.



Screen plantings between roadways

- 3) Deciduous trees in conjunction with low shrubs and groundcover will allow filtered or open views from windows.
- 4) Do not select plants that at mature size will block views from windows or access to building entrances.
- 5) Large shrubs and dense evergreen trees should generally be reserved for use along blank facades or to screen unsightly utilities.

6.6.0 Screen Plantings

- 1) Plantings used to provide visual screens should be upright and dense material planted close together.
- 2) Mass plantings of shrubs can be used to screen views below eye level.
- 3) Deciduous trees should be planted in the foreground to provide seasonal interest.

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- 4) A/E's shall first consult with the Base Civil Engineer for approval of the selection of plant materials that are appropriate to the area. (See list of approved shrubs that are marked for screening in section 6.8.0 of this document).

6.6.1 Evergreen Trees

- 1) Plantings shall be integrated into the total landscape design.
- 2) For every 35 linear meters of area to be screened, a minimum of 10 evergreen trees should be planted in a staggered row and arranged to visually block a majority of the area to be screened.
- 3) Trees should be typically on center at 2-3 meters.
- 4) Trees should be a minimum of 2 meters high.

6.6.2 Deciduous Trees

- 1) For every 35 linear meters of area to be screened, a minimum of three deciduous trees should be planted for accent and visual interest.
- 2) Trees shall be a minimum caliper of 5 cm.
- 3) Do not specify chestnut (*Aesculus hippocastanum*). Replace existing chestnut trees with one of the following: *Quercus robur*, *Carpinus belutus*, *Acer campestere*, *Celtis australis*, *Cercis siliquastrum* or equal suitable substitute.

6.6.3 Shrubs

- 1) Low screen shrub plantings, should be tightly spaced at no more than 1 meter on center and left unsheared to create a solid mass and eliminate added maintenance.
- 2) Shrubs shall not be spaced to appear as individual plants upon their maturation.

6.7.0 Grass Seed Mix

The recommended grass seed mix for Aviano Air Base is as follows:

20% <i>Lolium perenne</i>	(Perennial Rye Grass)
5% <i>Agrostis Tenuis</i>	(Browntop)
10% <i>Poa Pratensis</i>	(Smooth-Stalked Meadow Grass)
45% <i>Festuca Arundinacea</i> "Bardeluc"	(Fescue spp.)
20% <i>Festuca Ovina</i>	(Sheep's Fescue)

Seeding rate shall be 35 grams/sm.

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

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6.8.0 Plant Selection Lists

6.8.1 Large Tree Selection List

BOTANICAL NAME	COMMON NAME	Type	Mature Height	Mature Spread	Exposure	Irrigation	Streetscape	Foundation	Barrier	Screen	Accent	Wetland	Erosion Control	Parking	Wildlife	1st	2nd	3rd
<i>Acer campestre</i>	Field Maple or Hedge Maple	D	6m	6m	F	M	•							•	•		•	•
<i>Acer monspessulanum</i>	Maple																	•
<i>Acer palmatum</i> "Atrpourpurea"	Red Japanese Maple	D	3m	3m	F	M		•			•	•		•		•		
<i>Acer platanoides</i>	Norway Maple	D	9-12m	6-7m	F	M	•										•	•
<i>Acer rubrum</i>	Red maple																•	
<i>Acer saccharinum</i>	Silver maple															•	•	
<i>Amelanchier canadensis</i>	Serviceberry	D	6-10m	5m	F	L				•						•		
<i>Betula alba</i> , (<i>papyrifera</i>) spp.	Silver Birch, (Birch)	D	8m	6m	F	M						•				•		
<i>Betula pubescens</i>	Downy Birch or White Birch	D	20-25m	10-15m	F	M						•				•	•	
<i>Carpinus betulus</i>	White Hornbeam	D	8-12m	6-7m	F	L	•							•			•	•
<i>Carpinus betulus</i> "Fastigiata"	Fastigiata Hornbeam															•	•	
<i>Catalpa atlantica</i> "Glaucous"	Blue Atlas Cedar															•		
<i>Catalpa bignonioides</i>	Indian Bean Tree																	•
<i>Celtis australis</i>	Hackberry	D	8-20m	10-12m	F	L	•							•				
<i>Cercis siliquastrum</i>	Juda's Tree	D	4-6m	4m	F	L		•				•						
<i>Cotinus coggygria</i>	Smokebush	D	10m	10m	F	L				•	•						•	•
<i>Crataegus oxycantha</i> "Paul's Scarlet"	Hawthorn	D	7m	4m	FP	L			•		•	•			•	•	•	
<i>Crataegus prunifolia</i>																		•
<i>Fagus "Atrpourpurea"</i>	Purple-leaved Beech	D	22-40m	24-30m	F	L				•		•	•					
<i>Fagus asplenifolia</i>	Fern Leaved Beech	D	5-6m	3-5m	F	M												
<i>Fagus sylvatica</i>	Common Beech	D	30-40m	18-20m	F	M												
<i>Fraxinus excelsior</i>	Common Ash	D	12-18m	8-10m	F	L	•										•	•
<i>Fraxinus excelsior</i> "Westof's Glorie"																•	•	
<i>Fraxinus ornus</i>	Manna Ash																	•
<i>Ginkgo biloba</i> (male species only)	Ginkgo or Maiden Hair	D	18-22m	12-20m	F	L	•				•				•	•		
<i>Gleditsia triacanthos</i> "Sunburst"	Thornless Honeylocust	D	8m	6m	F	L	•							•		•		

KEY: E = Evergreen D = Deciduous F = Full Sun P = Part Shade S = Shade L = Low M = Medium H = High

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6.8.1 Large Tree Selection List (continued)

BOTANICAL NAME	COMMON NAME	Type	Mature Height	Mature Spread	Exposure	Irrigation	Streetscape	Foundation	Barrier	Screen	Accent	Wetland	Erosion Control	Parking	Wildlife	1st	2nd	3rd
Ilex aquifolium	Common Holly																•	•
Koelreuteria paniculata	Golden Rain Tree	D	5-7m	5-10m	F	L					•					•		
Lagestroemia indica	Crape Myrtle	D	3-5m	3-5m	F	L	•				•					•		
Ligustrum lucidum	Privet															•		
Liquidambar styraciflua	Sweet Gum	D	5-10m	5-10m	F	L			•							•		
Liriodendron tulipifera	Tulip Tree															•		
Magnolia x soulangiana	Saucer Magnolia	E	5-10m	5-10m	P	L					•	•				•		
Magnolia stellata	Star Magnolia															•		
Malus floribunda	Flowering Crabapple	D	3-5m	3-5m	F	L	•				•					•		
Malus sylvestris	Crab Apple																	•
Ostrya carpinifolia	Hop Hornbeam																	•
Parrothia persica																•		
Platanus x orientalis	Planetree															•	•	
Populus alba	White poplar																•	
Populus nigra "Italica"	Lombardy Poplar																•	
Prunus "Amanogawa"	Japanese Flowering Cherry															•		
Prunus "Kanzan"	Japanese Flowering Cherry															•		
Prunus "Tai Haku"	Japanese Flowering Cherry															•		
Prunus avium	Wild Cherry																	•
Prunus avium "plena"	Wild Cherry Double Gean	D	8m	5-7m	F	L					•							
Prunus serrulata	Wild Cherry	D	5-6m	5-6m	F	LM					•				•	•	•	
Prunus subhirtella "Autumnalis Rosea"	Autumn Cherry															•		
Quercus robur	English Oak or Common Oak	D	18-24m	18-20m	F	L	•					•		•	•			•
Quercus rubra	Northern Red Oak	D	12-14m	8-10m	P	M	•					•		•	•			
Sophora japonica	Japanese Pagoda Tree	D	8-9m	8-10m	F	L												
Tilia cordata	Littleleaf Linden	D	12-24m	6-12m	F	L	•	•				•		•			•	•
Tilia euchlora	Lime																•	
Ulmus glabra	Wych Elm																	•
Ulmus parvifolia	Chinese Lacebark Elm	D	2-8m	3-6m	F	L	•				•				•	•	•	

KEY: E = Evergreen D = Deciduous F = Full Sun P = Part Shade S = Shade L = Low M = Medium H = High

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6.8.2 Shrub Selection List

BOTANICAL NAME	COMMON NAME	Type	Mature Height	Mature Spread	Exposure	Irrigation	Streetscape	Foundation	Barrier	Screen	Accent	Wetland	Erosion Control	Parking	Wildlife	1st	2nd	3rd
Abelia grandiflora "Edward Goucher"	Edward Goucher Abelia	D	.5m	.5-.7m	FPS	L		•	•							•		
Azalea obtusum	Kurum Azalea	E	.5m	.5m	F						•							
Azalea spp.																•		
Berberis spp.	Barberry	D	.6m	.6m	F		•	•	•		•			•	•			
Ceanothus spp.	Ceanothus Hybrids	E	2m	2m	F	L	•	•			•					•		
Chaenomeles spp.	Flowering Quince		.5-1m	1-1.5m												•	•	
Cornus alba "Argenteomarginata"																•		
Cornus florida "Alba"	Tatarian Dogwood															•		
Cornus kousa Chinensis	Kousa Dogwood															•		
Cornus mas	Cornelian Cherry Dogwood																	•
Cornus sanguinea	Bloodtwig Dogwood																	•
Corylus avellana	Hazel	D	3-5m	2m	F					•								•
Cotoneaster horizontalis	Rockspray Cotoneaster	D	.5-1.5m	2-4m	F			•			•			•	•			
Cotoneaster divaricatus	Spreading Cotoneaster	E	2m	2m	F			•			•		•			•		
Cotoneaster apiculatus	Cranberry Cotoneaster	E	.5m	.5-1m	F			•			•					•	•	
Cotynus spp.	Smoke Tree	D	3-5m	2-4m	FP													
Crataegus monogyna	Hawthorn																	•
Cytisus scoparius	Common Broom	E	1.5-2m	1.5m	F													
Cytisus x praecox	Warminster Broom	E	1.5-2m	1.5m	F													
Deutzia magnifica																•		
Deutzia "Mont Rose"																•		
Deutzia rosea																•		
Elaeagnus ebbingeii	Russian Olive															•	•	
Euonymus alatus	Burning Bush															•	•	
Euonymus alatus 'Compactus'	Compact Burning Bush	D	1.5m	1.5m	F			•	•							•		
Euonymus europaeus	Spindle																	•
Forsythia intermedia																	•	
Forsythia x intermedia	Forsythia	D	3-4m	5m	P						•					•	•	
Genista lydia	Broom															•		

KEY: E = Evergreen D = Deciduous F = Full Sun P = Part Shade S = Shade L = Low M = Medium H = High

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6.8.2 Shrub Selection List (continued)

BOTANICAL NAME	COMMON NAME	Type	Mature Height	Mature Spread	Exposure	Irrigation	Streetscape	Foundation	Barrier	Screen	Accent	Wetland	Erosion Control	Parking	Wildlife	1st	2nd	3rd
Hebe akaensis	Shrubby Veronica															•		
Hebe rackaiensis	Veronica	E	.5-1m	.5-1m	FP		•	•						•				
Hibiscus syriacus	Althea	D	3-4m	5m	P					•								
Hydrangea hortensis	Hydrangea	E	.5-2m	.5m	P	H				•						•		
Ilex aquafolium "Nellie Stevens"	Nellie Stevens holly	E	3-5m	3m	F		•	•								•	•	
Ilex crenata "Mariesii"	Japanese Holly	E	1-3m	2-3m	F		•	•	•	•								
Juniperus chinensis	Chinese Juniper	E	.5-2m	1-3m	F	L				•							•	
Kolkwitzia amabilis	Beauty Bush															•		
Laburnum Watererii	Laburnum	D	5-6m	3-4m	F													
Lantana Camara	Lantana	E	.5m	.5m	F							•						
Lavendula angustifolia	Lavendar	D	5m	.5m	F						•							
Lavendula spica "Hidcote"	Hidcote Lavendar	D	.3m	.45m	F		•	•			•			•				
Ligustrum vulgare	Wild privet																	•
Lonicera pileata																•		
Lonicera spp.	Honeysuckle Hybrids	E	.5m	2m	P								•					
Mahonia aquifolium	Oregon Grapeholly	E	.6-1m	.6-1.5m	FPS		•	•		•	•					•	•	
Mahonia bealei	Mahonia	E	2-3m	2m	FPS		•	•										
Mahonia x "Charity"																•		
Malus Profusion																•		
Nandina domestica	Chinese Sacred Bamboo															•		
Nandina spp.	Heavenly Bamboo	E	1-3m	.5-2m	F	L	•	•		•	•			•		•	•	
Philadelphus virginialis	Mock Orange															•	•	
Photinia fraserii "Red Robin"	Red Tip Photinia															•	•	
Picea abies, glauca nidiformis	Dwarf Blue Spruce	E	1-3m	1-2m	P	M				•								
Pittosporum tobira	Pittosporum	E	1-2m	1-2m	FP	L				•						•	•	
Potentilla spp.																•		
Prunus laurocerasus "Zabelliana"	Zabelliana Laurel															•		
Prunus lauruscerasus	English Laurel	E	2m	1-2m	P	M				•			•			•	•	
Prunus spinosa	Blackthorn																	•

KEY: E = Evergreen D = Deciduous F = Full Sun P = Part Shade S = Shade L = Low M = Medium H = High

CHAPTER 6 – LANDSCAPE DESIGN

6.8.2 Shrub Selection List (continued)

BOTANICAL NAME	COMMON NAME	Type	Mature Height	Mature Spread	Exposure	Irrigation	Streetscape	Foundation	Barrier	Screen	Accent	Wetland	Erosion Control	Parking	Wildlife	1st	2nd	3rd
Rhamnus catharticus	Purging Buckthorn																	•
Rhododendron spp.	Rhododendron Hybrids	E	1-2m	4m	P	M				•	•					•		
Ribes sanguineum	Blood Currant	E	1-2m	1-2m	F	M				•						•		
Rosa arvensis	Field rose																	•
Rosa canina	Dog Rose																	•
Rosa mediland																•		
Rosa rugosa	Wild Creeping Rose	D	1-2m	1-2m	F	L					•					•	•	
Sambucus nigra	Elder																	•
Spiraea japonica spp.	Japanese Spiraea Hybrids	D	1-2m	1-2m	F	M		•	•									
Spiraea x bumalda	Bumald Spiraea	E	1-2m	.5m	F	L							•					
Spiraea x bumalda "Anthony Waterer"	Anthony Waterer Spiraea															•		
Spiraea x vanhouttei																•	•	
Symphoricarpos albus var. laevigatus	Snowberry																•	
Syringa vulgaris	Lilac	D	3-4m	5m	P	H					•					•	•	
Taxus spp.	Common Spreading Yews	E	1m	1-2m	F	L		•	•	•							•	•
Viburnum bodnantense "Dawn"																•	•	
Viburnum davidii																•		
Viburnum lantana	Wayfaring Tree																	•
Viburnum opulus	Guelder Rose																	•
Viburnum plicatum "Mariesii"																•		
Viburnum spp.	Viburnum Hybrids	E	2-3m	1-2m	P	M		•		•								
Viburnum tinus "Eve Price"	Eve Price Viburnum															•	•	

KEY: E = Evergreen D = Deciduous F = Full Sun P = Part Shade S = Shade L = Low M = Medium H = High

CHAPTER 6 — LANDSCAPE DESIGN

6.8.3 Groundcover and Vine Selection List

BOTANICAL NAME	COMMON NAME	Type	Mature Height	Mature Spread	Exposure	Irrigation	Streetscape	Foundation	Barrier	Screen	Accent	Wetland	Erosion Control	Parking	Wildlife	1st	2nd	3rd
Ajuga reptans "Atropurpurea"	Red Bugleweed	D	.2-.5m	.2-.5m	P	M					•					•		
Alyssum montanum "berggold"	Gold Alyssum	E	.2m	.2m	P	M					•							
Arctostaphylos spp.	Kinickinick	E	.2-.5m	.2-.5m	F	L				•						•		
Armeria maritima	Thrift															•		
Bergenia cordifolia																•		
Campanula portenschlagiana	Star Flower															•		
Cerastium tomentosum	Snow in Summer	E	.2m	.2m	P	M					•					•		
Companula portenschlagiana	Star Flower	E	.2m	.2m	P	M					•							
Convallaria majalis grandiflora	Lily of the Valley	E	.5m	.5m	F	L					•					•		
Coreopsis verticillata moonbeam	Moonbeam Coreopsis	E	.5m	.5m	P	M					•							
Cotoneaster dammerii "Coral Beauty"																•	•	•
Cotoneaster dammerii "Skogholm"	Creeping Cotoneaster	E	.2-.5m	.2-.5m	P	L							•			•	•	•
Cotoneaster salicifolia "Repens"																•	•	•
Dianthus deltoides	Pink Dianthus															•		
Festuca glauca	Blue Fescue	E	.2-.7m	.2-.7m	F	M					•		•			•		
Hebe pinguifolia "Pageii"																•		
Hedera helix	English Ivy	E	.3m	2-4m	FPS	L							•	•		•	•	•
Hedera helix	English Ivy																	
Hedera helix "Hybernica"	Irish ivy															•	•	
Hypericum calycinum																•	•	
Iberis sempervirens or Iberis	Candytuft	E	.2-.5m	.2-.5m	P	M					•					•		
Iris foetidissima	Iris															•	•	
Iris germanica "Nana"	Dwarf Iris															•		
Juniperus horizontalis	Blue Carpet Juniper	E																
Juniperus spp.	Juniper	E	.2-.5m	1-2m	F	L							•				•	
Lavandula angustifolia "Monstead Wood"	English Lavender	E	.5m	.5m	P	L					•							
Lavandula spica "Hidcote"	Lavender															•		
Pachysandra terminalis	Pachysandra	E	.2-.5m	.2-.5m	P	L							•			•	•	
Parthenocissus tricuspidata	Boston Ivy	D	.3-.5m	.3-.5m	F	L				•	•					•		

KEY: E = Evergreen D = Deciduous F = Full Sun P = Part Shade S = Shade L = Low M = Medium H = High

CHAPTER 6 – LANDSCAPE DESIGN

6.8.3 Groundcover and Vine Selection List (continued)

BOTANICAL NAME	COMMON NAME	Type	Mature Height	Mature Spread	Exposure	Irrigation	Streetscape	Foundation	Barrier	Screen	Accent	Wetland	Erosion Control	Parking	Wildlife	1st	2nd	3rd
<i>Pelargonium peltatum</i>	Ivy Geranium	E	.2-.5m	.2-.5m	P	M					•					•		
<i>Phlox paniculata</i>	Garden Phlox															•		
<i>Phlox subulata</i>	Creeping Phlox	E	.3-.5m	.3-.5m	P	L					•							
<i>Rosa</i> spp.	Climbing Rose Hybrids	D	2-6m	2-4m	F	L			•		•					•		
<i>Sedum spectabile</i> "Autumn Joy"	Stonecrop															•		
<i>Symphoricarpos</i> x <i>Cheanaultii</i> "Hancock"	Snowberry															•	•	
<i>Thymus herbabaronia</i>	Sprawling Thyme	E	.1-.2m	.4m	FP	L	•				•							
<i>Trachelospermum asiaticum</i>	Asiatic Jasmine	E	.1-.3m	1-1.5m	FP	L							•	•		•		
<i>Trachelospermum jasminodes</i>	Jasmine															•		
<i>Veronica prostrata</i>	Creeping Veronica	E	.1-.3m	.5-.6m	P	L							•			•		
<i>Vinca major</i>	Periwinkle															•		
<i>Vinca minor</i>	Periwinkle	E	.1-.3m	1-2m	PS	M							•			•	•	
<i>Vinca minor</i> "variegata"	Variegated Periwinkle	E	.1-.3m	1-2m	PS	M					•		•			•		
<i>Waldsteinia ternata</i>																•		
<i>Wisteria chinensis</i>	Chinese Wisteria	E														•		
<i>Wisteria sinensis</i>	Purple Wisteria	D	3-8m	3-6m	FP	L				•	•		•					

KEY: E = Evergreen D = Deciduous F = Full Sun P = Part Shade S = Shade L = Low M = Medium H = High

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 7 — SIGNAGE

7.1.0 Introduction

This chapter outlines the requirements for signs at Aviano Air Base. Effective signage contributes significantly to the overall impression one has of the Base. A simple, coordinated, and well-designed sign system can be one of the most effective elements in unifying the visual appearance of the Base.

7.2.0 General Guidelines

Signs are most effective when they are part of a total orientation system that includes base maps, street signs, building signs, and guidance from gate personnel. An effective orientation system is logical, easy to follow, and leads visitors from the point of entry to the desired destination with no confusion. To design an effective orientation system, the following points should be considered:

- 1) All signage shall conform to Air Force Sign Standards Pamphlet 32-1097.
- 2) Exterior signage shall have a standard brown background (color code RAL 8002).
- 3) All traffic signs shall conform to MUTCD (Federal Highway Administration's Manual on Uniform Traffic Control Devices).
- 4) Placement of banners or advertisements at the exterior walls of buildings is not allowed.

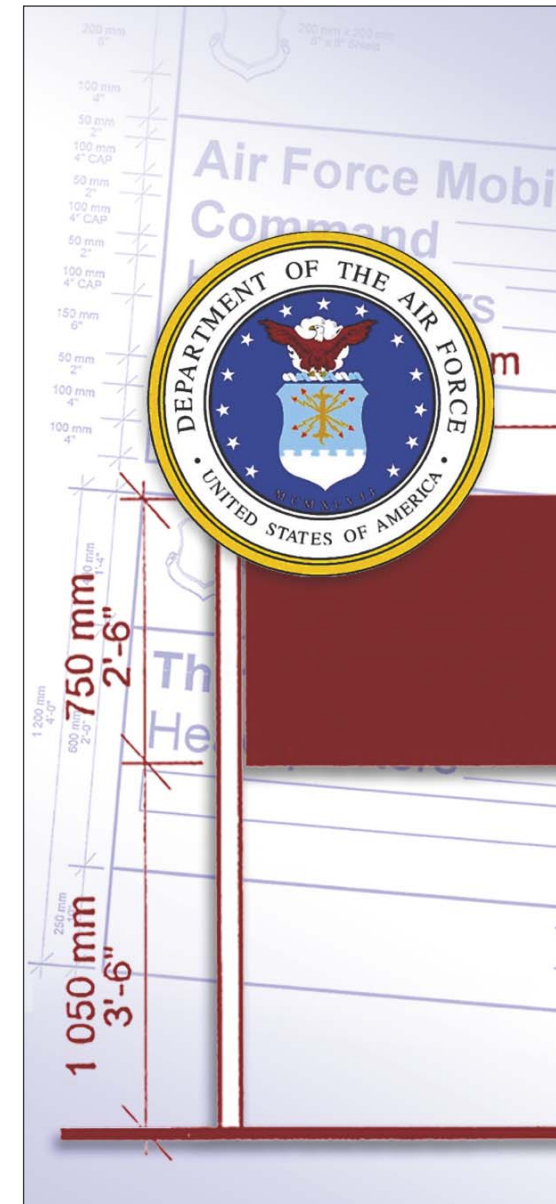
7.3.0 Sign Control Group

The Base Civil Engineer office has a sign control group designated to review and approve sign needs, design, and placement. It is mandatory to coordinate any sign design process with this group. The sign control group includes representatives from:

- 1) Civil Engineer
- 2) Security Police
- 3) Wing Safety

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.



Air Force Sign Standards pamphlet 32 - 1097

CHAPTER 8 — ARCHITECTURAL DESIGN

8.1.0 Introduction — Architectural Design Standards

The basic architectural design standards described in this chapter shall be used for all construction, upgrade, and renovation work at Aviano Air Base. The design standards have been formulated to provide general recommendations for the design of future projects so that they relate to the local architectural vernacular, visually unify the district in which they are located, and promote a cohesive Base image. These standards define a specific vocabulary of materials, colors, and forms that constitute the basis of the Aviano Air Base design character. The following paragraphs furnish a description of the design guidelines for specific building types, characteristics, and elements.

8.2.0 Regional Architecture Influences

The Friuli Venezia-Giulia region is rich in architectural design heritage. Area influences include classical Roman structures and monuments dating back more than 2,000 years, renaissance Palladian villa architecture, and medieval and renaissance Italian rural and urban architecture.

Local precedents generally include stone or masonry load-bearing wall construction with pitched heavy timber roof structure. The exterior wall finish is typically composed of cement and lime stucco, although exterior walls in exposed stone are common. Roof material is typically in rounded clay tiles or “coppi”. Finished marble or other dense stone are

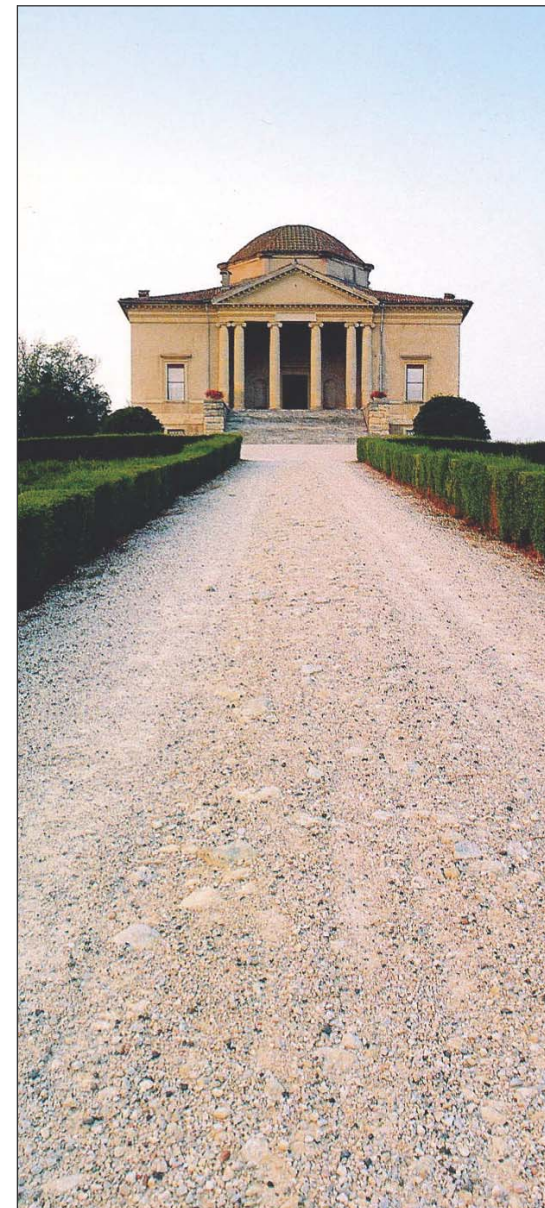
used extensively for door lintels and window framing. Arches are also used as a substitute for lintels. External wood shutters of varying styles are generally installed at window openings. In many instances, city streets are colonnaded to provide protection from winter weather and relief from summer sun.

Three part hierarchies are often developed for building elevations. The street level relates to pedestrians and traffic on the roadway. The second tier is generally composed of larger windows than those on the third level in three-story buildings. The third level may include ornamentation to delineate the “top” or “finish” of the structure.

Pre-20th century streets are often paved either in cobbles or cut stone. Streets generally follow contours of the land, vary in width throughout their course, and open out into a public square (or “piazza” in the Italian language) of variable size and geometry. The town’s principal squares typically contain monuments or fountains that serve as community focal points where people tend to gather.

8.2.1 Local Architectural Vernacular

Materials used in the local architectural vernacular include concrete frame structure, clay block masonry infill, and cement plaster stucco painted in muted earth and pastel tones. Railings are typically in steel or wrought iron, many with ornamental designs and detail. Roofs are generally of sloped (hip and gable) design with clay tile roofing. Doors and windows are generally in wood with a painted, or stained finish although pre-painted aluminum doors and windows are common in new or renovated structures.



Andrea Palladio - Precious regional architectural heritage

CHAPTER 8 – ARCHITECTURAL DESIGN

Windowsills and stairways are generally in granite or natural stone (marble, limestone, or travertine).

8.3.0 Building Types

Buildings on Aviano Air Base are divided into three types as follows:

Type 1 buildings are pedestrian in nature, one or two-story, detached and relate to the human scale.

Type 2 buildings are larger-scale (such as dormitories, theaters, gymnasiums) and often two stories or greater in height. These are typically intermingled with Type 1 buildings. The massing of Type 2 should be modulated to provide human scale.

Type 3 buildings are industrial in nature, relying on massing and simple forms to articulate function. These are clustered together or isolated apart from other structures.

8.3.1 Building Types and Context

The relationship of an individual building to its function and its surroundings creates context. The primary consideration for the visual environment is whether a building has a “foreground” or “background” context.

Type 1 and 2 buildings refer to “foreground buildings” or “destination buildings” whose function or location necessitates visual prominence such as the BX/Commissary, the Consolidated Support Center or the Wing Headquarters Building in Zappala, or the DoDDs School in Area A1. Type 3 buildings refer to “background buildings,” such as hangars and warehouses which are facilities that do not require a prominent image or location.

8.4.0 Building Forms and Proportion

The form and proportion of a building are basic elements relating it to its setting. They are also fundamental elements in defining the architectural quality of a building or groups of buildings.

- 1) Use building shapes similar and/or responsive to adjacent buildings.
- 2) Stress horizontal proportions in the design of facades of two or more stories. Design windows, entrances, and detailing to compliment those horizontal proportions. For multi-story buildings, varying the window size and framing at each floor provides visual interest.
- 3) Emphasize the various parts of buildings to clearly show a division of roof, wall, and base. Utilize colors, materials, or details to express divisions.
- 4) Simple forms can use reveals and fenestration rhythm to modulate walls.
- 5) Avoid blank building walls facing streets – utilize modulated openings or reveals to provide human scale. (Refer to Chapter 4 — Security Design for force protection criteria.)
- 6) Except for buildings of major significance, the scale of buildings shall not be monumental. Human scale is achieved by using smaller (1.5-3 m²) windows, doors, and details. Using normal floor-to-floor and floor-to-eave heights may also convey human scale.



Streetscape in Aviano



Rural church in Aviano with entrance porch



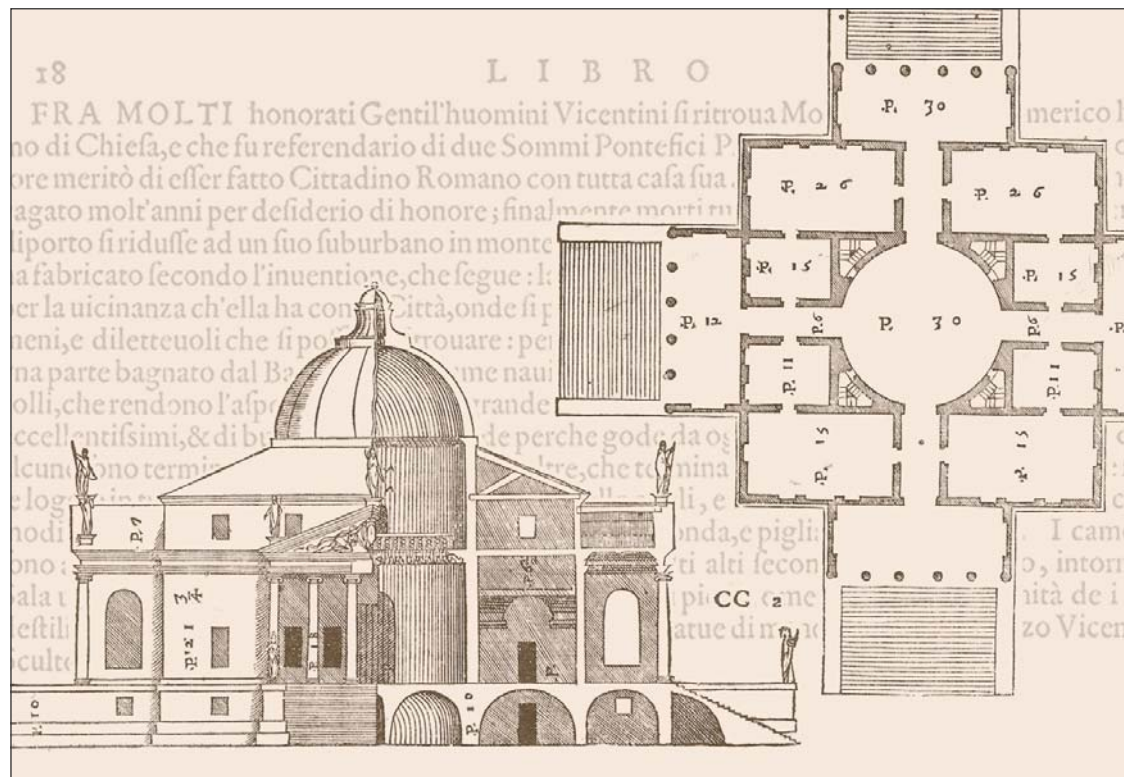
Rural dwellings in Aviano - internal courtyard

CHAPTER 8 — ARCHITECTURAL DESIGN

8.4.1 Mass & Scale

Forms and proportions of buildings are closely related to their mass and scale. The mass of a building refers to the volume a building encloses. Scale compares the elements of the building (doorways, windows, and details) to the human body.

- 1) Use simple building shapes, massing and proportions integrated with adjacent or like facilities to bring unity and order to a site.
- 2) Reduce “mass” wherever possible by breaking up large volumes and clustering them with small elements or by the application of smaller-scale porches/entranceways.
- 3) Avoid unmodulated wall areas. Instead, break up facades with porches, setbacks, pergolas, or ancillary or support structures.
- 4) Locate taller structures toward the back of the site, stepping down to pedestrian avenues with smaller scale buildings or attached transition elements.
- 5) Buildings shall be compatible with the scale of other buildings within the same Visual District and shall use massing appropriate to the district. (Refer to Chapter 3 — Comprehensive Planning, subchapter on Visual Districts.)
- 6) Major administrative buildings will have formal massing, signifying their relative importance.



Villa Rotunda in Vicenza; Palladio has significantly influenced local architecture.



Medieval center in Pordenone



Public square or piazza in Udine

CHAPTER 8 – ARCHITECTURAL DESIGN

8.4.2 Public Squares and Courtyards

The piazza and courtyard are essential elements in Italian Architecture. Because of the limited space in various areas of Aviano Air Base, multi-use, outdoor gathering spaces should be incorporated into projects, wherever appropriate, for a variety of activities (i.e., outdoor dining, gathering, bazaars, etc.).

- 1) Courtyard spatial definition and character shall be determined at the design's conception. In general, proportions should be controlled such that the width of the courtyard is greater than the height of the surrounding buildings.
- 2) The intended function of the piazza or courtyard must be considered. It may serve as a formal entrance to a building or a group of buildings, a social setting for gathering and relaxation, a recreation area for games or picnics, a place to be viewed from inside a building, or a combination of these functions.
- 3) Building siting dictates the size and location of piazzas. Defining a piazza may be achieved by considering proportion and building/landscape setback. It is important to define a sense of enclosure, a sense of space or a sense of place when conceptually defining the limits/boundaries of a piazza.
- 4) Consider the impact of future expansion on overall design and spatial definition.

8.4.3 Colonnaded Arcades

The colonnaded arcade (or “portico” in the Italian language) is also frequently encountered in surrounding villages and cities. They are an important typological element of Italian architecture and urban design and should be incorporated into sites and buildings where possible.

- 1) Porticoes in adjacent buildings need not be identical since variety will add to visual interest.
- 2) Porticoes shall be composed of elements (arches, column massing, etc.) compatible with the traditional Friuli Venezia-Giulia or neighboring Veneto style, i.e. round or shallow arches and/or rectangular structure.
- 3) Reserve higher arcades for administrative or public gathering areas requiring special prominence.
- 4) Engaged columns on large expanses of wall on secondary facades may be incorporated as dictated by design and functional requirements.
- 5) Use breezeways of similar detail to connect structures.

8.4.4 Roofs

Pitched roofs are an important component of the local vernacular style and play a critical role in defining appropriate massing and scale.

- 1) Roofs shall have a slope not less than 3:12.
- 2) Hip roofs are preferred, as is typical in the region, but gable-end roofs are permitted.



Colonnaded arcade along street in San Daniele



Venetian style “portico” in Udine

CHAPTER 8 — ARCHITECTURAL DESIGN

- 3) Vary the elevations of roof eaves within building groupings to create rhythm.
- 4) Flat roofs shall not be used unless specific approval is obtained from 31 CES/CEC before proceeding with design. The minimum slope shall be $\frac{1}{12}$.
- 5) Materials shall be clay tile. Type 1 and 2 non-industrial buildings shall use “coppi” or “Portuguese” rounded clay tile roofing. Type 3 industrial buildings shall use “marsigliese” flat clay tile roofing.
- 6) Factory-finished standing seam metal roofs with concealed fasteners are permitted for industrial buildings on a case-by-case basis where approved by 31 CES/CEC. Approval depends on the visual district, scale of the building, and adjacent building materials.
- 7) Utilize building construction to conceal gutters and downspouts wherever possible. When exposed, paint to match exterior wall color (not accent trim).
- 8) Roof appurtenances shall match the roofing color, e.g. vents and hoods.
- 9) Roof skylights are discouraged due to high maintenance requirements.

8.5.0 Elevations

Elevations shall be finished and detailed in a manner consistent with the design elements of the surrounding Italian architecture. The proportions of elevations must consider the most stringent applicable code for clear

ceiling heights required for habitable spaces. Refer to Chapter 19 — Appendix for applicable codes.

8.5.1 Walls

- 1) Break up multi-story buildings with horizontal relief when appropriate to relate the facility to human scale.
- 2) Articulate walls with horizontal /vertical elements to diminish mass of large-scale buildings.
- 3) Screening enclosures shall be constructed of the same materials as adjacent facilities.

8.5.2 Fenestration

The design of a façade’s fenestration, or pattern/rhythm/arrangement of openings, establishes an identity and scale for a building’s envelope and offers an opportunity for a building to relate to adjacent structures and site amenities.

- 1) Wall openings shall be framed with stucco, natural stone or precast concrete.
- 2) If the same material as the surrounding wall is used, provide a minimum 2 cm relief to provide a contrast against the “field” of the wall.
- 3) Sills and thresholds of Types 1 and 2 buildings shall be of stone material such as marble, limestone, or granite. Sills of industrial facilities may be constructed in metal.
- 4) Scale fenestration appropriately to the use of the building.



Typical local natural stone paving



Typical rural fenestration



Palazzo Panza, Varese - prestigious entrance courtyard

CHAPTER 8 – ARCHITECTURAL DESIGN

- 5) Window placement should relate to internal areas and provide a regular rhythm for the exterior. Window and mullion spacing shall consider the internal layout of spaces.
- 6) Use predominant and secondary facade materials consistently and on all sides of the building.

8.5.3 Entrances

The scale and detailing of an entrance gives the pedestrian a sense of the function and prestige of a building. Along with providing a break in building walls, entrances provide an identifiable point of entry and a refuge from weather.

- 1) The main entrance of a building should be readily identifiable by the use of architectural elements such as porches, canopies and scale.
- 2) Recessed entrances shall be incorporated into designs where enclosed entry porches are not provided.
- 3) Covered entries and arcades shall be used wherever space and function dictates and shall shield the entry from sun and rain.
- 4) Entries shall incorporate similar forms, materials, and details as the major building elements.

8.5.4 Materials

Material selection and application can define important design features of a project as well as establish relationships between buildings and surrounding areas. Exterior materials give color, texture, and scale to a building's appearance. Architectural details such

as cornices and reveals create interest and scale. Compatibility and consistency of materials contribute to the definition of each Visual District's character as well as the Base as a whole.

- 1) Walls on Types 1 and 2 Buildings shall include textures and detailing compatible with regional architecture.
- 2) Generally, walls shall have stucco surfaces except for selected Type 3 buildings incorporating metal siding.
- 3) Exterior finish will be stucco or EIFS. Lower sections of buildings in high traffic areas shall be finished with durable, impact resistant materials such as stone.
- 4) Use low-maintenance materials such as steel, concrete and tile. Avoid high-maintenance materials such as wood.
- 5) Exterior marble shall be "Giallo d'Istria" as used on the BX/Commissary.
- 6) Do not specify exposed metal, stainless steel, and natural aluminum.
- 7) Aluminum window frames shall be of dark-brown anodized aluminum.
- 8) No reflective glazing is permitted. Tinted, green glazing is the Base standard.
- 9) Exterior doors may be either aluminum or steel. Aluminum doors shall be anodized to match windows. Steel doors for service areas shall match the surrounding wall color.

8.5.5 Primary Wall Surface Materials Schedule

Materials	Color Specification Number/Finish	Building Type
Stucco Concrete	Painted Painted to match stucco	1
Stucco Concrete	Painted Painted to match stucco	2
Stucco Metal panels Concrete	Painted Painted to match stucco Painted to match stucco	3

8.5.6 Secondary Wall Surface Materials Schedule

Materials	Color Specification Number/Finish	Building Type
Marble Stone Concrete	Natural Natural Natural or painted to match stucco	1
Marble Stone Concrete	Natural Natural Natural or painted to match stucco	2
Marble Stone Concrete	Natural Natural Terracotta, natural or painted to match stucco	3

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8.5.7 Roof Materials/Colors Schedule

Material	Finish	Building Type
“Portugese” or “coppi” rounded clay tile roofing	Terracotta	1 & 2
“marsigliese” flat clay tile roofing	Terracotta	3
Metal (raised seam)	Factory finished, terracotta color	3

8.5.8 Exterior Wall Colors

Color contributes to the definition of facilities as foreground buildings, such as DoDDs school, BX Commissary, Medical Treatment Facility, or background buildings such as hangars, warehouses, electrical substations. Color unifies or emphasizes elements of a building. Related colors are a means to harmonize elements while maintaining visual interest. All buildings shall be painted to match the Base standard color range equal to “Baldini Vernici”. Refer to “Exterior Paint Color Schedules” at end of chapter for wall paint colors.

8.5.9 Colors of Miscellaneous Exterior Elements

- 1) Windows and primary door surrounds shall be approximately 15cm wide and painted secondary trim color “Bianco Sporco” color number 400-OX-154.
- 2) Railing shall match building primary trim color
- 3) Downspouts shall be factory finished to match wall color.
- 4) Metal fascias shall be factory finished to match primary trim color
- 5) Gutters shall be factory finished to match fascia finish.
- 6) Primary doors and frames may be painted an accent color to indicate its importance as an entrance.
- 7) Secondary doors and door frames shall be specified to match primary wall color.
- 8) Ventilation louvers shall be factory finished to match primary wall or door color as required.
- 9) Metal trim and flashing shall be factory finished to blend with adjacent wall color.
- 10) Post Indicator Valves (PIV's) and bollards shall be painted the same color as the fire hydrants. Color shall match “Baldini 300-OX-69”.
- 11) Exposed mechanical appurtenances that cannot otherwise be hidden shall be the same color as surrounding surfaces.
- 12) Graphics and stripes in paint schemes shall not be used.

8.5.10 Exterior Wall Paint Color Schedule

Trim Color	Wall Color	Facility Type	Area
400-OX-168	300-OX-69	Operations Facilities	C, F
400-OX-168	300-OX-74	Q.O.L. 1 Buildings	A1, A2, Zappala
400-OX-168	162-OX-26	Ops Facilities-2 & Q.O.L.2 (VQ/TLF)	Zappala, F
400-OX-168	Match Zappala Dorms	Dormitories	Zappala

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8.5.11 Primary Wall Trim Colors

Use sparingly, mainly at eaves and for roof flashing.

Color Specification Number	Building Type
400-OX-154	1
400-OX-154	2
400-OX-154	3

8.5.12 Secondary Wall Trim Colors

For window and door opening surrounds only. Color “Bianco Sporco.”

Color Specification Number	Building Type
400-OX-154	1
400-OX-154	2
400-OX-154	3

8.6.0 Passive Design

Aviano Air Base has a hot climate for a good portion of the year and a moderate winter. Many passive design techniques can be and should be utilized to improve the quality-of-life for occupants, reduce energy consumption, reduce maintenance requirements, and enhance the aesthetics of the built environment. Buildings on the Base may be designed to include passive summer cooling principles and solar gain features for the winter months.

The following items should be considered when designing any new facility:

- 1) Roof overhangs, balconies, wing walls, trellises, etc. should be responsive to and be effective in providing shade with local sun angles.
- 2) Sensitive arrangement of adjacent structures to achieve shading and funneling of breezes.
- 3) Design for maximum cross-ventilation where feasible.
- 4) Where possible, orient buildings with the long axis running north-east to south-west to minimize summer heat gain.
- 5) West windows should be designed to minimize heat gain by incorporating shading devices such as movable shades or other methods of bris soliel.
- 6) Provide deciduous trees on west and south sides of buildings to provide shading during summer and to facilitate solar gain during winter.
- 7) Minimize use of reflective surfaces around buildings, such as parking lots and abutting sidewalks, to reduce glare and heat gain.
- 8) Provide vestibules and deep-set front porches to protect entries from temperature extremes. An acceptable transition zone is desired between the unprotected environment of a parking lot and the interior environment. Covered entries and vestibules effectively provide this transition.
- 9) Consider earth berming (carefully addressing drainage concerns) to reduce exterior walls exposed to temperature extremes.

- 10) Place outside stairwells and other non-conditioned space on exterior walls to help buffer the building from heat and cold.
- 11) Install R-30 ceiling or roof insulation.
- 12) All windows shall have thermal pane glass and high-quality metal frames. Metal frames should have integral thermal breaks. (Refer to Chapter 19 — Appendix)
- 13) Windows should be operable so that they may be opened during mild weather.
- 14) Install pitched roofs with adequate ventilation. Gable vents relying on natural air movement are insufficient; soffit vents, ridge vents and electric fans are generally required.
- 15) Employ daylighting features in compliance with Italian norms.
- 16) All thermal insulation for exterior walls shall conform to applicable codes.

8.7.0 Disabled Persons Accessibility

Accessibility for disabled persons to facilities must conform to the most stringent of the codes referenced in the Chapter 19 — Appendix.

8.8.0 Support Spaces

Facilities will have the following rooms incorporated into the design, unless excepted by programming documents or 31 CES/CEC:

- 1) Administrative Spaces: Refer to Chapter 19 — Appendix for referenced codes.

CHAPTER 8 — ARCHITECTURAL DESIGN

- 2) Maintenance Spaces: Janitor closets shall be provided in sufficient quantity relative to overall facility size.
 - 3) Communication Rooms: Communication rooms shall be provided in sufficient quantity relative to the overall facility size. Rooms shall be sized and configured so they are not classified as a confined space. Refer also to the Chapter 19 — Appendix.
 - 4) Mechanical Rooms: Mechanical rooms shall be included within building; all exterior mechanical equipment such as exterior ducts shall be screened from view. Doors shall be large enough for equipment removal. Provide minimum space of one meter around all mechanical equipment for maintenance. If double doors are not possible, provide knockout, removable walls to allow removal and replacement of large equipment such as boilers. Refer also to Chapter 13 — Mechanical Design for operating and maintenance requirements.
 - 5) Other: Grounds maintenance closets (designed in coordination with 31 CES/CEF), break rooms, storage, etc., will be provided in sufficient quantity relative to the overall facility size and as required by building programming.
- 2) Panic hardware, including that fitted on fire-rated doors, must be compatible with interchangeable core Base standard.
 - 3) Heavy duty doors and hardware shall be specified for all high traffic areas (i.e. additional hinges, heavier gauge materials, door closers, etc.).
 - 4) Hardware must conform to all codes for accessibility for disabled persons as referenced in the Chapter 19 — Appendix.
 - 5) Door hardware shall be standardized throughout an entire facility.

References

Chapter 5 — Site Design for relationship with architectural issues.

Chapter 6 — Landscape Design for relationship with architectural issues.

Chapter 17 — General Provisions for Construction for contractor's obligations.

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

8.9.0 Door Hardware

- 1) All locks on Base must be compatible with the existing key-removable interchangeable core Base standard.



Main clock tower in downtown Aviano

CHAPTER 9 – INTERIOR DESIGN

9.1.0 Introduction

The success of every project is dependent on the active involvement of all team members throughout the entire design process, from conception to realization.

Careful review and approval of furniture, interior materials and finishes must be maintained by 31 Civil Engineer Squadron (CE) in order to ensure proper coordination with current projects and future design efforts. Procurement of inappropriate finishes and furnishings without CE approval/coordination often results in disjointed interior design. Rectifying disjointed interior design and ill-fated self-help projects can be difficult and costly.

In order to ensure proper development of a facilities interior, a program of “Interior Excellence” has been developed. It is imperative that Wing Leadership support this program to ensure base-wide compliance. Designation of a single point of contact for each facility on Aviano Air Base (usually the facility manager or appointed custodian) is essential for success. This POC will regularly coordinate with the CEC, assisted by the Base Interior Designer, and rely on his/her expertise to specify future purchases so that no overlap or specification of inferior products will occur. Education of POCs over time will enhance the interior environment and improve the quality of life at Aviano Air Base.

9.2.0 Interior Design Process

The role of the interior designer in a project shall start during the planning stage before the design process begins. Planning establishes parameters in terms of programming and budget; furniture systems, casework, furnishings, and other elements of interior design requiring resources must be considered, planned and budgeted into a project from its inception.

The interior designer shall be responsible for delineating a detailed scope and budget for casework systems, furnishings, and finishes.

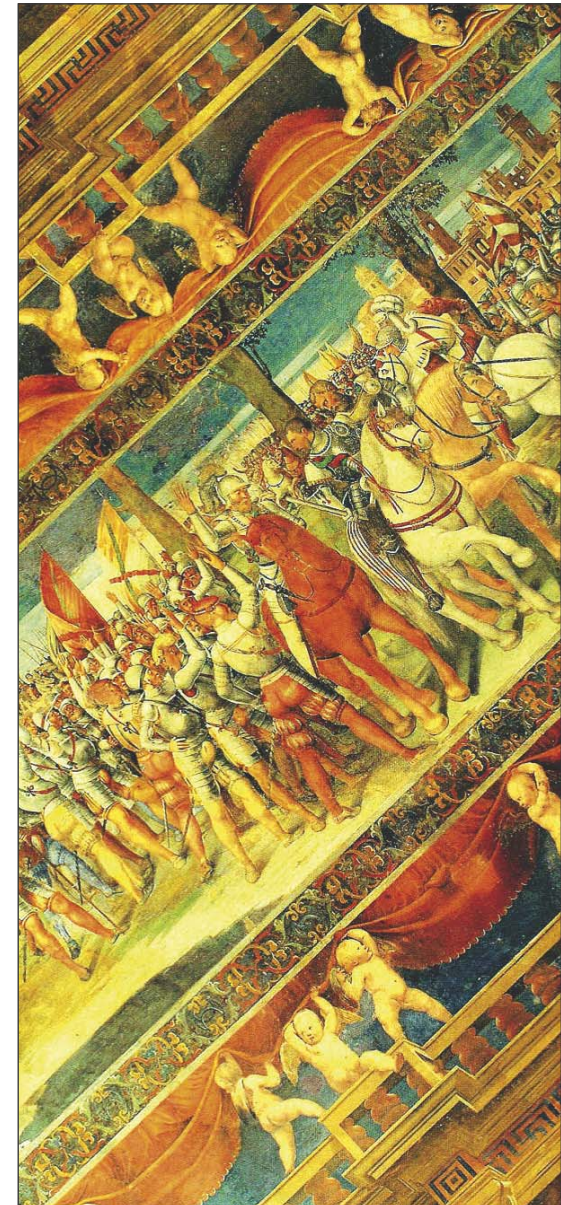
Once the project scope and budget are determined, the interior designer will begin working with Base Contracting personnel to ensure an understanding of project interior design requirements. Maintaining a collaborative working relationship with Contracting ensures that specific requirements of interior design are addressed and that all required elements are specified.

9.3.0 Product Requirements

New product development should be investigated as well as availability and reliability of existing products and services. A check of user satisfaction in similar facilities will help in making critical design decisions.

9.3.1 Durability

The function of a space will determine the durability of required products and finishes. For example a maintenance hangar would demand a very different set of fixtures and finishes in response to large equipment



Ceiling fresco in an Italian villa

and industrial usage versus an administrative office which requires an interiors selection geared more toward the human user. Aesthetics, how the finishes/materials relate to the other design elements, and costs must also be justified.

9.3.2 Maintenance

The use of easily maintained finishes is critical for an efficient, cost-conscious military installation. It is the user's responsibility to establish a maintenance schedule in coordination with Civil Engineer.

While certain finishes may provide excellent durability, the designer must also give serious consideration to maintenance requirements. The maintenance plans of many facilities have minimal quality assurance and finishes that wear well and require less maintenance have proven to be best for the Base community.

9.3.3 Aesthetics

Aesthetics must also be considered alongside durability and cost efficiency when selecting finishes. For example, materials that may be very durable, such as painted concrete masonry units would make an interior office space feel industrial and sterile. The designer must consider product performance and longevity of aesthetic, initial costs, and maintenance costs when making selections. If the appeal of the surface of a furniture item degrades or appears dated over time, the user will want to replace it prematurely. Classic products and proven materials that hold their appearance, appeal and shape longer are generally a better choice over time even when the initial cost is higher.

9.3.4 Quality

Numerous case studies and product durability testing demonstrates that quality does not necessarily cost more. Quality products perform better and wear longer. Usually these products are backed by manufacturers' warranties to assure the customer's continued satisfaction after installation is complete. The designer shall select finishes and furniture items from manufacturers that consistently honor their warranties and have a successful record of standing behind their products. Users need to ensure that warranty information is maintained in a clearly identified location and ensure that any product failure is promptly repaired by the manufacturer.

9.4.0 Finish Materials

All finish materials must meet current National Fire Protection Association (NFPA) standards, fire codes, Italian standards and abrasion testing. The A/E is responsible for ensuring that a product meets all required tests and that test results are documented by the appropriate governing agency. Products from manufacturers that cannot provide independent testing data shall not be considered. An additional two (2) percent of finish materials shall be specified for future use in replacement and repair. The Designer shall provide a written record of all materials and finishes selected, including manufacturer, catalog or lot number, color name and/or number, and contact information for the initial supplier.

9.4.1 Floors

For renovations, avoid installing resilient flooring material, tile or carpet over existing ceramic tile, heavily textured or uneven floors. This may cause "telegraphing" of the underlayment pattern onto the new material, resulting in rapid wear and unsightliness. Existing floor surfaces must be properly leveled and prepared per manufacturer instructions before installing new material.

- 1) Floor surfaces shall be selected with both function and aesthetics in mind. Durability, resistance to wear, ease of maintenance, comfort underfoot and slip resistance are important considerations.
- 2) Natural finish or sealed concrete floors shall be limited to maintenance areas, utility rooms, electrical rooms, storage areas, mechanical rooms and other areas as required by the customer.
- 3) Special consideration must be given when specifying raised flooring systems and laboratory spaces. These floor systems shall utilize anti-static conductive floor tiles and/or carpet tiles.
- 4) The use of recessed walk-off mats in vestibules and on the interior side of doors that open directly to the outside to protect carpeting and tile surfaces are encouraged. Avoid mats with complicated or garish designs.
- 5) Stained wood base is recommended rather than painted base in upgraded areas. Granite, tile and marble are also recommended base materials.

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- 6) Floor maintenance must also be considered when specifying materials. For example, the specification of a stained wood base is a poor choice in conjunction with a flooring surface that requires continuous wet mop maintenance.
- 7) Low maintenance tile flooring materials shall be used wherever suitable.
- 8) Vinyl floorings shall be used only where specifically required by particular use requirements such as medical facilities or laboratories.

9.4.2 Sheet Vinyl

- 1) Specified sheet vinyl shall be a minimum of 2.0mm (3.2 gauge in high traffic areas) and shall be monolithic in color and pattern to full depth of wear level (1.27 mm).
- 2) Avoid “white” as a predominant color.
- 3) Install according to manufacturer’s instructions, giving special care to seams.
- 4) “No wax” finishes shall be limited to light traffic wear areas only.
- 5) An integral cove base shall be used with sheet vinyl flooring in areas where sterilization is a concern. Examples of these types of areas include clean rooms, laboratories, childcare centers and medical rooms.

9.4.3 Solid Vinyl or Vinyl Composition Tile (VCT)

- 1) Specified vinyl composition tile shall be 305mm x 305mm tile, 3.2mm gauge and shall be monolithic in color and pattern to full thickness of tile.



Low maintenance ceramic floor tiling in Commissary facility

- 2) “No wax” finishes shall be limited to light traffic wear areas.
- 3) Install according to manufacturer’s instructions.
- 4) Avoid “white” as a predominant color.
- 5) Vinyl Composition Tile should be limited to maintenance areas, break rooms, vending areas, storage areas, utility rooms and high traffic corridors.
- 6) For areas where carpet is not practical or too costly, VCT may be used with creative patterns or border/field configuration.
- 7) Sheet goods should be used rather than tile in areas where multiple seams are a clean-up problem such as in clean rooms, laboratories, childcare centers, and medical rooms.

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9.4.4 Ceramic Floor Tiles

- 1) The use of low maintenance ceramic floor tiles is encouraged. Italy produces a wide selection of high quality, relatively inexpensive tiles. Specify non-slip granite ceramic tile, quarry tile, or pavers with an integral color throughout for high traffic or wet areas. Examples of these types of areas include building entries, corridors, counter reception areas, food lines, vending areas, food preparation areas, laundry areas, toilets and lobbies.
- 2) Use tile floorings for dormitories, temporary lodging facilities, visiting officers quarters and other billeting facilities.
- 3) Tiles with smooth glossy finishes are slippery and often do not meet friction requirements as dictated by code. High-gloss and polished tiles shall be used as accents only.
- 4) Larger tiles require less grout seams and are easier to maintain.
- 5) Specified grout color should match the tile as closely as possible in most cases. Avoid light colored grout for ease of maintenance.
- 6) A mottled or shaded tile is easier to maintain than an overall flat color.
- 7) A tile base shall be used with all tile floors. Coordinated cove or bullnose style base tiles shall be used with floor tiles.

9.4.5 Carpet

- 1) Minimize the use of carpet in Base facilities.
- 2) For specific requirements, minimum quality features, types and use locations, refer to ETL 94-3, Air Force Carpet Standards and the HQ AFCEE Carpet Selection Handbook for all facilities.
- 3) Provide reducers, metal strips or other threshold edging in areas where carpet abuts other flooring surfaces.
- 4) Carpet or carpet tile should be limited to conference rooms unless functional requirements dictate otherwise. Avoid light colors, bold geometric patterns, and subdued tweeds.
- 5) Carpet appearance and durability depend on carpet fiber and backing material, dye and manufacturing methods, thread count, weight and padding selection. Carpets with brand name nylon fibers will wear better and provide more resilience than those made from polyester, acrylic or olefin fibers. Both fiber and yarn construction affect the luster, color retention, and resistance to wear patterns of carpets.
- 6) Use solid colored carpets in executive suites, courtrooms, chapels or as a border or inset. When selecting a carpet, use a large sample when coordinating overall compatibility with related finishes. A small sample may not accurately show all colors or the overall pattern.
- 7) Avoid predominantly dark colored carpets (navy, black or dark green) as they tend to show lint, dust and dirt faster than a less saturated surface color.
- 8) Use recessed walk-off mats in vestibules and on the interior side of doors that open directly to the outside to protect the adjacent carpet or tile surfaces.
- 9) Areas designated to receive carpet should adhere to the following minimum specifications:
 - a) Construction: Textured multi-colored level loop
 - b) Face Yarn: 100% solution-dyed or yarn-dyed nylon.
 - c) Yarn weight: 28 oz/sq.yd. for carpet tile or polypropylene backing, 32 oz/sq. yd. for broadloom
 - d) Gauge: $\frac{1}{10}$
 - e) Stitches per inch: 11/inch
 - f) Backing: 100% synthetic, polypropylene. No jute or natural fibers.
- 10) Fire Resistance requirements: Proposed carpets must conform to the Federal Flammability Standard FF1-70 (Pill Test) and ASTM E648. Carpet and carpet systems (carpet and pad) tested in accordance with ASTM E648 must meet the following criteria:
 - a) Minimum average critical radiant flux of 0.45 watts/sq.cm for corridors in unaccompanied personnel quarters, billeting facilities and hospitals.

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- b) Minimum average critical radiant flux of 0.22 watts/sq.cm for carpet in all other facilities.

Testing Agencies:

- a) FFA-70 (Pill Test) — Office of the Secretary, Consumer Product Safety Commission, Washington D.C. 20207
 - b) American Society for Testing and Materials E648 — Naval Publications and Forms Center, 5801 Tabor Ave, Philadelphia, PA 19120.
- 11) Executive/Command areas and the chapel may receive upgraded cut pile carpeting with the following minimum specifications:
- a) Construction: Cut pile or cut and loop pile. Solid or multi-colored or textured multi-colored level loop
 - b) Face Yarn: 100% solution dyed or yarn-dyed nylon.
 - c) Yarn weight: 30oz/sy for carpet tile or 36oz/ for broadloom.
 - d) Gauge: $\frac{1}{8}$
 - e) Stitches per inch: 12/inch
 - f) Backing: 100% synthetic, polypropylene. Jute or natural fibers are not permitted.
- 12) Face weight: The minimum face weights listed in ETL 94-3 shall apply unless the selected carpet has passed the ARR (Appearance Retention Rating) test at the required level for the type of facility. In this case the minimum carpet face weight may be automatically waived.

9.4.6 Concrete or CMU Walls

Furring channels shall be used on concrete, CMU, or structural clay tile surfaces serving as a base for gypsum wallboard.

9.4.7 Wall Coverings

- 1) Vinyl wall covering and paneling must have a Class A fire rating.
- 2) Whenever possible, terminate wall covering at an inside corner. Where not feasible, always provide edging to protect exposed edge.
- 3) All wall coverings shall comply with Air Force flame spread/smoke generation and durability regulations.
- 4) Fabric-backed and paper-backed vinyl wall covering are best for maintenance and cleanability; fabric-backed are generally the most durable.
- 5) Carpet applied to a wall surface is a violation of recognized fire codes and will not be permitted.
- 6) Wall coverings be used to add visual interest, hide soil, enhance design characteristics, and coordinate an overall color scheme. All types of wall covering (vinyl, fabric, or acoustical) shall be selected for specific situations (as outlined above) depending on the functional and durability requirements.
- 7) Wall covering shall have a business-like or "contract" appearance. Residential or floral patterns should be avoided.

- 8) Wall coverings are categorized as follows:

- a) Type I: (Residential) — 7 oz per sq.yd. minimum, used in distinguished visitors' suites, visiting officers' quarters and executive administration areas. The use of this type of wall covering shall be limited.
 - b) Type II: 13 oz per sq.yd. minimum, used in medium-use areas and some high-use areas.
 - c) Type III: 22oz per sq.yd. minimum, used in high traffic and high-use areas and where walls need frequent cleaning.
- 9) In extremely high traffic areas where walls will receive intense abuse, Types II or III should be installed.
- 10) All walls to receive wall covering shall be painted with one coat of oil base primer sealer. Install wall covering according to manufacturer's recommendations.
- 11) In areas where acoustical properties are important (or behind dartboards) acoustical wall covering shall be used.
- 12) Acoustical wall covering may be used in auditoriums, education/training rooms, conference rooms, dining halls, projection rooms, executive areas and large open lobbies. Selected acoustical wall material must conform to fire rating requirements.
- 13) Fabric wall coverings maybe used only in executive suites, executive conference rooms and special areas receiving limited use.

9.4.8 Ceramic Wall Tile

- 1) Glazed or unglazed tile may be used as surfaces for walls.
- 2) Ceramic tile shall be used in all janitor closets and in toilet and shower areas.
- 3) Floor to ceiling tile shall be installed on wet walls such as showers. Wainscot tile behind lavatories shall be a minimum of 1.5 meter high.
- 4) Accent colors or varied shapes of tile may be used as design features.
- 5) Use bullnose or “vee” shapes available from the manufacturer for corner moldings.

9.4.9 Wood Paneling

- 1) When specified for use on walls, wood paneling must have a Class A fire rating. Pressboard paneling with an imitation vinyl or paper veneer is unacceptable.
- 2) Exposed edges of paneling at chair rail (30” to 32” on center) or wainscot (42” to 48”) height shall be finished with a proportionally adequate wood trim molding stained to match paneling.
- 3) Paneling shall be reserved for courtrooms, executive office spaces and conference rooms.
- 4) Any wood elements specified must have a Flame Spread of 25 or under and shall be appropriately trimmed with wood.

9.4.10 Wall Panels

- 1) Acoustical wall panels are an excellent choice for conference rooms, areas which require speech privacy, or areas adjacent to noise from outside (particularly in Area F).
- 2) Do not use gypsum wallboard pre-finished with wallpaper or vinyl wall coverings. These materials require a definitive seam between each panel and are very difficult to patch when dented or scratched.
- 3) Metal wall panels or strips shall be avoided when possible. Where use of metal strips on walls is necessary, ensure that metal is electrostatically painted to match the wall.
- 4) All wall panels must have a Class A fire rating.

9.4.11 Wall Base

- 1) Wall base may be wood, rubber, vinyl, ceramic tile (where applicable), granite, marble, carpet or sheet vinyl as is appropriate with adjacent floor and wall materials.
- 2) Install a cove cap if carpet or coved sheet vinyl is used as a wall base.

9.4.12 Miscellaneous Wall Accessories

- 1) All fire extinguisher cabinets, drinking fountains, panel boxes and other equipment boxes shall be recessed in the wall.
- 2) All conduit, telephone wires, computer cables, pipes, etc. shall be concealed behind the walls or in soffits.

- 3) All electrical switch plates, electric devices and light switches shall match in color and be coordinated with the overall color scheme.
- 4) All sealants used must match the color of the adjacent surface.
- 5) Use chair rails in areas where there is high incidence of damage to walls. These areas include corridors with cart traffic, lounges, equipment storage areas and rooms with perimeter seating. A durable hard wood chair rail or molded impact resistant plastic bumper guard shall be used to protect the wall surface.
- 6) Place the chair rail at heights proportional to the wall height and at the appropriate height where the items will be damaging the wall.

9.4.13 Ceilings

- 1) The appropriate scale of a space is often determined by the height, lighting, and detailing of the ceiling. Exposed ceilings shall be used only as an elaborate design element or in maintenance areas, utility rooms, and electrical/mechanical rooms.
- 2) Equipment added to the ceiling such as speakers, microphones, security devices and HVAC vents shall match the ceiling field color.
- 3) Recess equipment mounted to the ceiling whenever possible. All wires, conduits, and support devices for speakers, cameras, etc. shall be concealed from view.
- 4) Avoid using metal ceilings.

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9.4.14 Acoustic Tiles

Acoustical ceiling tiles set in a suspended grid offer soundproofing as well as access to structural, mechanical, electrical and communications systems.

- 1) 60cm x 60cm size tile is preferred.
- 2) Suspension systems may be exposed or semi-exposed. Do not use concealed suspension systems.
- 3) Upgrading ceiling tiles with stepped edges may be used only in executive/command or special areas.
- 4) Do not use acoustical ceiling tiles on walls for sound absorption.
- 5) Black tile may be used for only in projection rooms.
- 6) A medium to light texture or fissured tile shall be specified. A heavy textured ceiling tile tends to look dirty as it cast shadows.
- 7) Acoustical ratings of tiles shall ensure adequate compensation for the close proximity of active aircraft.

9.4.15 Gypsum Board

- 1) Gypsum board is preferable to plaster on lath for suspended ceiling applications.
- 2) Gypsum board may be specified sparingly for design impact in executive/command areas and high visibility public use facilities.
- 3) Use moisture-resistant gypsum board if used in wet areas.

9.4.16 Window Coverings

- 1) Use window coverings that enhance the overall design scheme and meet the functional requirements.
- 2) Fabric blinds shall be avoided due to the difficulty associated with cleaning.
- 3) Vertical blinds may be used only in executive/command areas. Horizontal blinds should be used in other facilities and may not be necessary where rouladins are specified. Control cords and turning wands should be placed on the same side for ease of handing. Use blackout blinds, draperies, or rouladins for all sleeping rooms.
- 4) Draperies should be used only in executive/command areas, clubs and billeting rooms or quarters.
- 5) 100% Trivera intrinsic FR Polyester fabrics shall be used to meet fire code requirements. Drapery hardware must be heavy-duty commercial grade. All draperies (except where sheer draperies are used over other draperies) should be lined with neutral colored fabric and have bottom weights at each side and at vertical seams. The lining fabrics should be the same throughout a single building for exterior uniformity appearance. Draperies for executive/command area, billeting rooms and general quarters may be triple pinch pleated with 2.5 fullness.

9.5.0 Paints and Coatings

- 1) All interior paints should be lead free, with either no Volatile Organic Content (VOC) or low VOC.



Library space of DoDDs school in Area A1

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- 2) Use a satin or eggshell finish on the walls of low traffic areas. Use an “orange peel” finish on walls in high traffic areas.
- 3) Epoxy semi-gloss paint should be used in areas such as kitchens, toilets, laundry and medical rooms.
- 4) Avoid stark whites. Off-whites and “toned-down” or subdued hues are best for hiding soil.
- 5) Painted stencil wall designs are not acceptable. These designs and applications convey a residential and unprofessional atmosphere.

9.6.0 Colors

- 1) Color coordination must be approved by the Base Interior Designer.
- 2) Use neutral colors for permanent finishes to allow for a variety of color schemes to be developed as desired over the life of a facility. Permanent finishes include tile, terrazzo, plastic laminate built-ins, stone, bathroom fixtures and window blinds.
- 3) Use bolder accent colors only for non-permanent finishes. These finishes include carpet, paint, vinyl wall covering, upholstery, and drapery material. In toilet rooms bright color tiles may be used as an exception as an accent band or for accent details.



Common room in dormitory complex

- 4) Vary intensity of colors to provide visual relief from the monotony of neutral colors.
- 5) Use small amounts of intense colors in accessories and artwork for visual stimulation. All prints and posters must be framed, professionally mounted and approved by the Base Interior Designer.
- 6) Quarters should be neutral so occupants may add their preferred accent colors.
- 7) Consider lighting when selecting colors. Actual color rendition will depend upon the lamps specified by the electrical engineer. Rooms may have a different ambiance at night; quarters, MWR facilities and other facilities used at night should be designed with consideration for morning and evening occupancy.

9.7.0 Furnishings

- 1) Furnishings must be durable, aesthetically coordinated and require low maintenance.
- 2) Refurbishment shall coordinate with existing Base interiors as directed.
- 3) Products and materials shall be of a proven standard and quality.
- 4) Materials shall be new and fit for their intended use.
- 5) Designs shall have clean and simple lines.

9.8.0 Lighting

- 1) Natural, ambient and task lighting should be provided in all areas as determined by space function and use. Architectural interest may be achieved with coves, soffits, up-lighting, recessed fixtures or wall mounted fixtures such as sconces rather than typical fluorescent fixtures. In every case, energy consumption must be considered in the design and energy efficient fixtures and materials must be specified.
- 2) Overall ambient lighting in administration areas should be provided with fluorescent fixtures integral to the ceiling grid system. Task lighting and flexibility of control should be provided at each individual work area.
- 3) Use color-correct fluorescent lighting in dining rooms, food preparation areas, toilets, billeting rooms and other areas where true color rendition is important.
- 4) Floor and table lamps should be used in billeting to create a home-like feeling. Ensure lamps have weighty bottoms to prevent tipping.
- 5) Lighting in corridors shall be planned to avoid accentuating length. 60cm x 120cm fixtures used in long corridors shall be oriented perpendicular to the length of the corridor.

- 6) Bare bulbs are unacceptable. Specify only fixtures with a diffuser, lenses, globes, or have them concealed by a cove or soffit. Specify only uniform fluorescent lamp types (all warm white or cool white, etc) in an area or facility and replace with matching when re-lamping. Broken, worn or discolored lenses shall be replaced with matching lenses.
- 7) Light fixtures need to be carefully selected and spaced. Excessive glare or color shift can occur if placement and spacing are not carefully planned.

References

Chapter 14 — Electrical Design for lighting levels

Chapter 15 — Mechanical Design for plumbing and HVAC accessories

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

10.1.0 Governing Standards

- 1) All equipment and installation must comply with AFR 88-1, NFPA, and all Italian laws, norms and local regulations. All projects require Italian Fire Department (“Vigili del Fuoco”) review and approval. If US code is more stringent and does not violate Italian code then US code shall be used.
- 2) All new designs are subject to review by a qualified Fire Protection Engineer for compliance with DoD/ NFPA / MIL HDBK 1008C requirements.
- 3) Placement and installation of audio-visual warning devices shall be in accordance with American Disabilities Act or Uniform Federal Accessibility Standards.

10.1.1 Fire Alarm Maintenance

Italian Law under the EEC requires the Italian Air Force, responsible for the Base proper, to inspect and issue a certificate of compliance for each non-military type building (old and new ones coming on line) including schools, BX, dorms and other occupied buildings.

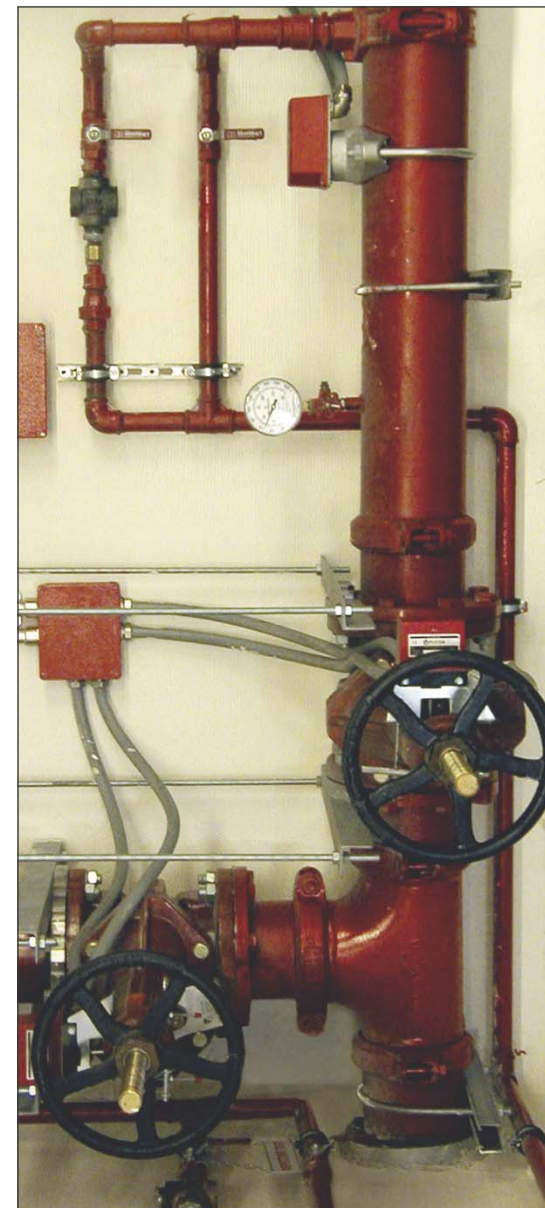
Certificates are required for every occupied building including those at Ghedi, Darby, COMM sites, etc. Fire alarm maintenance service cannot be executed on any building unless this certificate has been issued.

10.2.0 Water Supply System

- 1) The A/E shall obtain verification methodology from the 31 CES/CECC in order to calculate the rated flow for each facility. The A/E shall verify the capability of the existing water supply system and study the possible solutions necessary to meet the required water flow.
- 2) The A/E shall conduct water flow tests before designing any fire protection system and shall coordinate planned water pressure and quantity with project designs and specifications for Slice 42/3AF 47060 Water Supply and Distribution Project.
- 3) Provide a dedicated Fire Water line into facility from water main, separate from the potable water/HVAC water entrance — install the Post Indicator Valve (PIV) after the Potable/HVAC water connection exterior to the building.
- 4) Provide 2½ inch exterior Y-type Fire Department External Connection outside mechanical room for sprinklers only and provide drawing details.
- 5) Alternate power supply shall be provided for fire pumps.

10.2.1 Riser Entrance

A seismic expansion anchor sleeve detail drawing shall be provided for firewater entrances to all facilities. Drawing must indicate expansion sleeve, tie-rods, and thrust blocks.



Typical sprinkler system valves

CHAPTER 10 – FIRE PROTECTION

10.2.2 Back-Flow Prevention Devices

- 1) Requirements and drawings for back-flow prevention devices suitable for Fire Water systems, Hi-X Foam, IAW UPC, IPC etc. shall be included.
- 2) Locate inside mechanical room.
- 3) Back-flow devices for fire systems 4" and above shall be Ames brand Model 2000SS or approved equal.

10.2.3 Post Indicator Valves

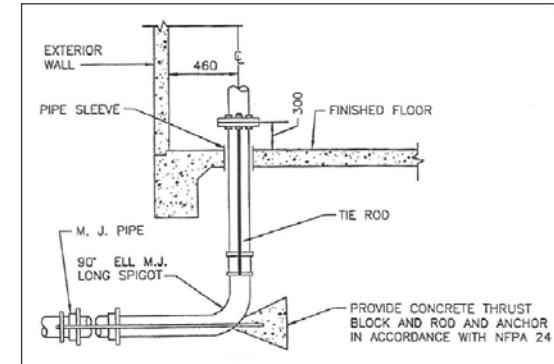
- 1) Connections to public water systems shall be controlled by post indicator valves (PIV's) of an approved type and located not less than 40ft (12.2 m) from the buildings protected. Exception: If this cannot be done, the post indicator valves shall be placed where they will be readily accessible in case of fire and not liable to injury.
- 2) Where post indicator valves cannot readily be used, as in congested areas, underground valves shall conform to these provisions and their locations and direction of turning to open shall be clearly marked.
- 3) Protective bollards in accordance with MIL HDBK 1008C shall be provided if the post indicator or fire hydrant is installed near a parking lot or road. Show PIV and bollard details on drawings.

10.2.4 Gate Valves

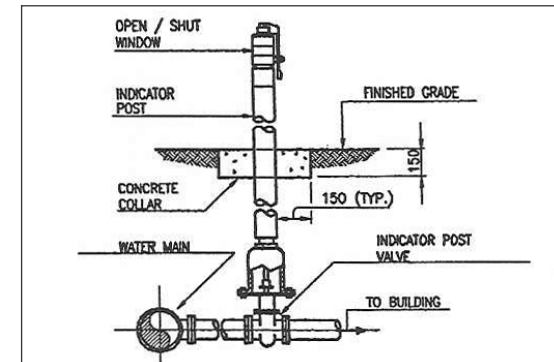
- 1) A gate valve (outside screw and yoke type) shall be provided on the fire protection water supply side of the main sprinkler valve inside facilities with sprinklers.
- 2) The gate valve shall be provided in addition to the post indicator valve located in the fire protection feed main outside the building. The valve stem must have an alarm switch (Potter brand or equivalent) connected to the facility fire panel to alert the base fire department in event of tampering with the facility sprinkler water supply.

10.2.5 Fire Hydrants

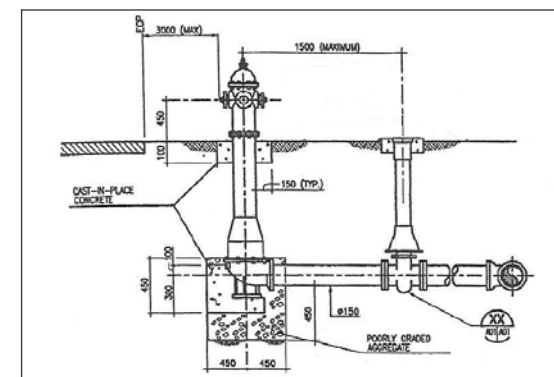
- 1) Fire hydrants shall comply with MIL HDBK 1008C requirements.
- 2) For new construction, at least one street hydrant shall be located within 150 feet (45 m) of fire department connections and all corners of the facility shall be reached by a hose lay of not over 350 ft (110 m) as per MIL HDBK 1008C.
- 3) Street Hydrants shall be installed not closer than 3 feet (1 m) and not farther than 7 feet (2 m) from the roadway shoulder or curb line.
- 4) Ensure existing hydrants are no further than 350 ft from any corner of facility. If not, add additional hydrants to meet 350-foot hose reach criteria.
- 5) Hydrants shall be installed with not less than 6-inch (152mm) connection to the supply main, and valved at the connection.



Standard riser entrance detail



Standard riser post detail



Standard fire hydrant detail

CHAPTER 10 — FIRE PROTECTION

- 6) Provide 3 each connections for new fire hydrants as follows:
 - a) A 5 inch HydroStorz Brand quick connection
 - b) A 70 mm Italian Fire Department male connection
 - c) A 2½" US connection
- 5) Penetrations through fire rated concrete floors and walls shall be made with pipe sleeves. All penetrations shall contain fire stopping with a fire rating equal to that of the area being penetrated. Show details on drawings.
- 6) Smoke and heat detectors will be used in all sleeping quarters.

10.3.0 Standard Requirements

- 1) Interior finishes (other than exits) must be Class A or B. Interior finish for exits, exit passageways, hospital patient rooms, sleeping rooms, and correction facilities shall be Class A only. Class B interior finish may be substituted for Class A interior finish throughout health care facilities that are completely protected with automatic sprinklers and have quick response sprinklers installed throughout smoke compartments containing sleeping rooms. Carpeting shall meet standards outlined in MILHDBK 1008C, ETL 00-6 and NFPA 101.
- 2) Facilities shall have internal fire area compartmentation/separation construction if justified by the type of occupancy and equipment/document value.
- 3) Electrical and communication rooms shall be 2-hour fire rated.
- 4) Fire rated partitioning shall be included during the design phase of large or multi-purpose buildings where a sprinkler system is to be installed.
- 7) Sprinkler protection is required in all sleeping areas. Sprinkler protection shall be used in all guest rooms and guestroom suites utilizing listed quick response or listed residential sprinklers in accordance with NFPA 13, 13R and 101.
- 8) Ventilation system for heated gases and smoke exhaust is required. Ventilation unit shutdowns shall be provided.
- 9) Manual pull stations shall be located at all exit doors or any other specific interval in accordance with NFPA 101 and NFPA 72. Manual pull stations shall be a type NBG-10 or an approved equal with no replaceable parts. Fire pull stations shall be painted red.
- 10) Provide fire extinguishers as required by NFPA 10 in recessed cabinets. Show cabinet locations and details on drawings. Include fire extinguishers in all Base renovation and construction contracts IAW, MIL HDBK-1008C, and DoD requirements. Extinguishers are required in sprinkled facilities as per NFPA.



Sprinkler head detail



Typical spray applied fire protection /wet pipe sprinkler

- 11) Fire extinguisher cabinets shall be installed so that the top of the recessed cabinet shall be no more than 5 feet (1.53m) above the floor. In no case shall the clearance between the bottom of the cabinet and the floor be less than 4 inches (10 cm).
- 12) Fire alarm panel and firefighter cut-off switch shall be mounted in the vestibule of the primary entrance. Zonal areas will be graphically depicted in a professional manner.

10.3.1 Exits

- 1) Exits shall be sufficient in number and location to meet travel distance and discharge capacity of the facility load per NFPA 101, as well as Italian laws and norms and local regulations.
- 2) All exit signs shall be illuminated (maintained), located and designed in accordance with NFPA 101, ETL 90-5 as well as Italian laws and norms and local regulations. The “running man” pictogram exit sign is approved for the marking of means of egress.
- 3) All exit doors including main entrances will have panic hardware installed.
- 4) All required fire exit doors must open in the direction of egress travel.
- 5) Interior finish of exit systems must be of Class A or Italian equivalent.

10.3.2 Emergency Lighting

- 1) Emergency lighting shall be provided to allow setting of equipment in safe conditions and allow evacuation of facilities in accordance with ETL 99-4.
- 2) Exit lighting fixtures over facility emergency egress doors shall be illuminated at all times. In all other places emergency lighting shall automatically illuminate during power outages. Emergency lighting must have a self-contained power source of 90 minutes minimum.

10.3.3 Kitchens

- 1) Hood and duct system shall be constructed in compliance with National Fire Code (NFC) 96 Standards.
- 2) Fire suppression system for hood and ducts must comply with NFC 96, NFC 17 and AFOSH 27-59.

10.4.0 Fire Detection and Alarm Systems

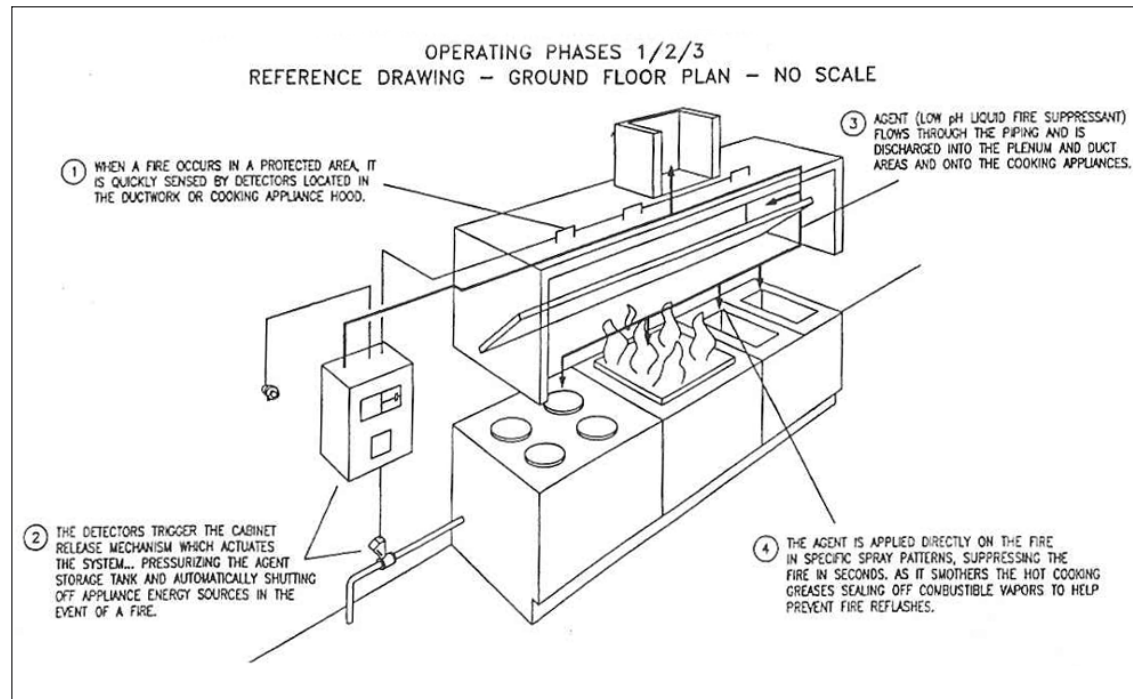
- 1) All new buildings and renovation projects shall provide a multi-zone fire detection system.
- 2) The system will be radio linked so fire detection detonation will notify the Fire Department Alarm Room of activation.
- 3) The fire detection and alarm system must be compatible with the Monaco BT2-3 170/1500 MHz transceiver system that operates on base. Provide Monaco Enterprise (or equivalent) Transmitter Panel and Antenna to contact base

Fire Department in event of a fire or alarm. Fire detection transceivers will have dual capabilities to transmit/receive via Monaco System radio transmitter.

- 4) The fire alarm panel must be equivalent to the existing Base alarm panel MAR 1-Thermostic Elettronica; documentation may be obtained directly from the Aviano Air Base Contracting Office. The MAR 1 panel complies with all ISO 9000 and CE certifications required by current Italian and EEC norms.
- 5) Automatic fire detection and alarm systems shall be provided with battery back-up power.
- 6) Every space within a building shall have smoke or rate of rise/heat or heat detectors or both or shall be sprinkled.
- 7) Do not provide unnecessary fire and smoke detection in rooms provided with 100% Wet Pipe Sprinklers. Provide sensors in sprinkled back shop rooms only where required by NFPA code — delete all redundant sensors.
- 8) Equipment composing the fire detection and alarm system, with the exception of the transceiver, shall be the product of a single manufacturer.
- 9) Detection system design must be approved by the Base Fire Department and the Aviano Air Base Fire Engineer.
- 10) Provide a schedule of signs for operation of the Fire Protection System. Provide signage for system valves, piping, and components in English and Italian.

CHAPTER 10 – FIRE PROTECTION

- 11) The A/E shall provide a schedule of Fire Pumps, Fire Alarm Panels, Transmitters, Alarm Valves and Fire Protection system equipment with all designs.
- 12) Fire Alarm System Schematics for new designs shall show the entire alarm and detection system, all sensors, pull stations and Fire Alarm Control Panel, etc. Show Fire Alarm Control Panel view, schematic, and details. Project drawings must show panel and antenna locations and details, and electrical/wiring details.
- 13) Electrical and mechanical drawings will also show location of automatic fire doors, fire and or smoke dampers, ceiling dampers, and similar means of fire protection for air duct systems.
- 14) The installed system must conform to all testing requirements and shall bear certification stating that the system and equipment has been correctly installed and regulated, functions properly and meets all applicable Italian laws, norms and local regulations. The certification shall be signed and stamped by an engineer/ technician of the equipment manufacturing company. The contractor must provide to the 31 CES/CEC all Certificates of Installation for all fire detection, suppression, and life safety systems prior to final acceptance.



Typical kitchen hood fire protection detail

10.5.0 Suppression Systems

10.5.1 Wet Pipe Sprinkler System

- 1) A wet pipe automatic fire suppression system shall be installed throughout a facility in accordance with applicable fire and life safety codes and regulations.
- 2) All storage areas as well as administrative offices shall be provided with a wet pipe sprinkler system served by a driven fire pump.
- 3) Sprinklers shall not be installed in electrical rooms nor communications rooms.

- 4) Provide sprinkler test connections for all facility sprinkler systems.
- 5) A minimum of six spare sprinkler heads and a sprinkler head wrench shall be provided in all new facilities with sprinkler protection.

10.5.2 Dry Pipe Sprinkler System

- 1) A dry-pipe system will be installed for data processing areas (ETL 93-5 will be followed).

- 2) If automatic sprinkler protection is to be provided, the installation will closely follow the construction and be placed in service before or immediately following completion of each story and before any completed area is occupied.

10.5.3 High Expansion Foam Systems for Aircraft Facilities

High-Expansion Foam Systems shall be installed in lieu of Aqueous Film Forming Foam (AFFF) in new Aircraft Facilities.

10.6.0 Gas Detection and Alarm System

The natural gas detection and alarm system shall include the following in accordance with the Aviano Air Base Fire Department requirements:

- 1) Natural gas leakage alarm panel equivalent to “Thermostic Elettronica” to be installed in heating room complete with ISO and CEE certifications.
- 2) One natural gas detector equivalent to “ex Alert mod.1419 Thermostic Elettronica” installed inside heating room, complete with ISO and CEE certifications.
- 3) One electrical stop valve with manual reset on main gas supply line installed outside the boiler room.
- 4) One trip coil on main circuit breaker of boiler room panel.

- 5) Two audio-visual alarm signals, having a different audio signal to that of fire alarm signal, one installed outside of the boiler room and one installed in the building management room. The alarm signal devices of the gas detection system shall not be connected to the Base fire alarm system.

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 11 — CIVIL DESIGN

11.1.0 Introduction

This chapter outlines the design standards for the water distribution, sewerage and gas distribution systems for Aviano Air Base. The A/E shall coordinate the design of all new connections to the existing utility network on Base with 31CES.

11.2.0 Earthworks

11.2.1 Backfill & Fill Material

Backfill material is defined as any material removed during excavation and reused on site.

Fill material is defined as any material brought to the site from an outside source.

- 1) Soil materials for backfill and fill shall be free of clay clods, rock or gravel larger than 6cm in any dimension, debris waste, frozen materials and other deleterious matter.
- 2) The backfill around utility lines shall be clean and free of rocks larger than the diameter of the pipe or 6cm, whichever is smaller.

11.2.2 Compaction

- 1) Backfill under pipes shall be compacted preferably to the spring line of the pipe. Any compaction above the pipe is done solely for the benefit of the subsurface above.
- 2) All trench backfilling shall be compacted and graded smoothly.

- 3) Construction equipment shall not be driven in the trench to compact backfill above utility lines. Doing so may result in damage to the utility line due to high stress.
- 4) Backfill and fill materials shall be placed in layers not more than 15cm in loose depth.
- 5) Before compaction, each layer of backfill or fill material shall be moistened or aerated as necessary to provide the optimum moisture content of the soil material.
- 6) Each layer of backfill shall be compacted to the percentage of maximum density required for the area.
- 7) Lift thickness shall not exceed 8 to 10cm in confined spaces that require the use of hand-powered equipment for compacting.

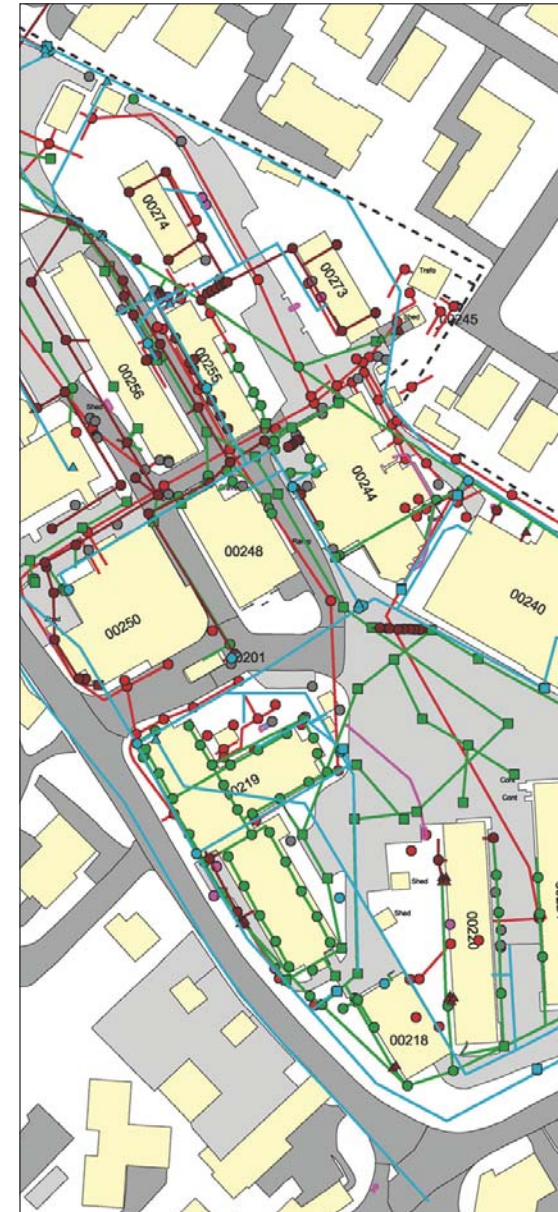
11.2.3 Grading

Natural slopes or grades shall be restored to their original condition where damaged or altered during construction.

11.3.0 General — Utilities

11.3.1 Existing Utilities

- 1) The A/E shall physically visit the site and is responsible for surveying, identifying and verifying all existing site utilities and showing them on all relevant drawings. Drawings of existing utilities supplied by Base office do not exonerate the A/E of their responsibility. The A/E shall consult 31 CES/CEOIW to coordinate the project designs and specifications with existing utilities. Drawings



Base utilities map extract

must clearly indicate all known existing site utilities (water, electric, communications, storm water, sanitary sewer lines and manholes, LPS grounding grids, fuel lines and fuel tanks).

- 2) The initial design phase must include a ground scan radar survey of the site to collect all data needed to identify or locate existing utilities. (Record drawings are generally not available.)
- 3) Service lines and solder shall be lead-free.

11.3.2 Parallel Line Separation

New pipelines shall be installed at:

- 1) a minimum of 0.60m from low voltage electrical lines.
- 2) a minimum of 1.00m from medium voltage electrical lines.
- 3) a minimum of 1.00 m from telephone lines.

11.3.3 Line Crossings

- 1) Sewer crossings shall not cross above drinking water lines.
- 2) Sewers shall be located no closer than 15 meters (50 feet) horizontally to water wells or earthen reservoirs to be used for potable water supply.
- 3) Sewers shall be located no closer than 3 meters (10 feet) horizontally to potable water lines; horizontal spacing may be a minimum of 2 meters (6 feet) where the bottom of the water pipe will be placed at least 300mm (12 inches) above the top of the sewer.

- 4) Sewers crossing above potable water lines must be constructed of suitable pressure pipe or fully encased for a distance of 3 meters (10 feet) on each side of the crossing. Force mains will have no joint closer horizontally than 1 meter (3 feet) to the crossing, unless the joint is encased in concrete. Concrete encasement shall be a minimum of 100mm (4 inches) thick at pipe joints.
- 5) A minimum of 30 cm of compacted earth shall separate new pipelines from telephone and electrical lines.
- 6) A minimum of 10 cm of concrete shall separate new pipelines from telephone and electrical lines.
- 7) The A/E shall provide a detail and schedule specifying the minimum allowed setback distances for water lines from other utilities (sewage, fuel oil, gas, and electric).
- 8) The A/E shall provide details for the protection of water lines located in the vicinity of electric, sewer lines, etc.
- 9) Show pressure-rated pipe sleeve and concrete encasement details for utility lines that pass within setback distance restrictions near water, sewer, gas, electric, fuel lines etc. Protection of utility lines shall be noted in drawings and specifications. The more stringent of US or Italian utility setback distances shall apply.
- 10) All roadway crossings shall be executed by boring unless otherwise approved by the 31 CES/CEC.

11.3.4 Pipe Bedding Details

- 1) Provide a 3mm diameter solid copper tracing cable above all buried utility lines (water, storm sewer, sanitary sewer, electric, communications, etc.). A separate plastic warning tape shall be located near the surface above each line. A combination foil/warning tape is not acceptable.
- 2) The plastic warning tape shall be marked for the appropriate utility service — i.e. “Water”, “High Voltage Electric”, etc.
- 3) The A/E shall provide pipe bedding details as part of the construction documents.
- 4) Exterior utility markers shall be horizontally mounted just above the ground level but low enough for grass cutting machinery to pass over.
- 5) Manhole covers and valve covers shall be level with finished landscaped surfaces; they shall not be covered by landscaping

11.3.5 Utility Meters

The installation of water meters is handled on a case-by-case basis by Base Civil Engineer. The A/E shall coordinate location/meter requirements with Civil Engineer.

- 1) All utility meters (water, gas, electric) shall be capable of being read onsite from the unit and be capable of remote monitoring from a future Base remote metering system.
- 2) Locate utility meters in cabinets within mechanical yards wherever possible.

CHAPTER 11 — CIVIL DESIGN

- 3) Provide a RS232 serial port cable in 15mm diameter PVC conduit from all meters to the facility Comm Room or Comm Panel location as required.

11.3.6 Protective Bollards

All gas cabinets, above ground fuel tanks, propane tanks, fire hydrants and PIV's located adjacent to roadways, parking areas, or other vehicle traffic areas shall be protected against impact by parking bollards. Bollards shall be designed to withstand a low speed impact from a large truck.

- 1) Bollards shall be constructed of heavy-duty galvanized steel pipe, a minimum 25cm in diameter, filled with steel re-bar and concrete and installed on a heavy-duty concrete foundation.
- 2) Bollards shall extend at least 100cm above grade.

11.4.0 Water Distribution

- 1) All buried water piping shall be thermo-welded HDPE pipe rated at 10 bar.
- 2) No buried flanges shall be used at water pipe joints.
- 3) Flanges must be located in either manholes or vault boxes.
- 4) A valve box shall be provided for the main service valve.
- 5) Devices shall be accessible for maintenance and inspection.

- 6) Drawings must include details for valves and couplings.

11.4.1 Riser Entrance

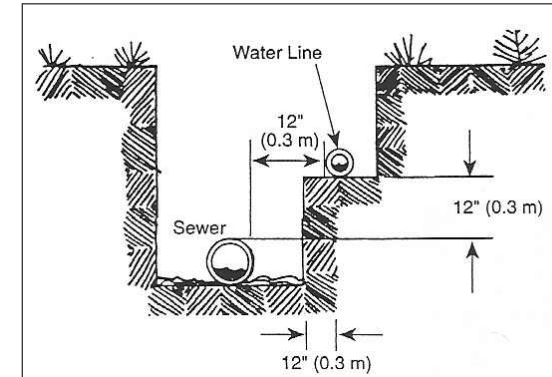
Seismic expansion anchor details shall be provided for potable water and firewater entrances to facilities. Details must include expansion sleeves, tie-rods, and thrust blocks.

11.4.2 Corrosion Control

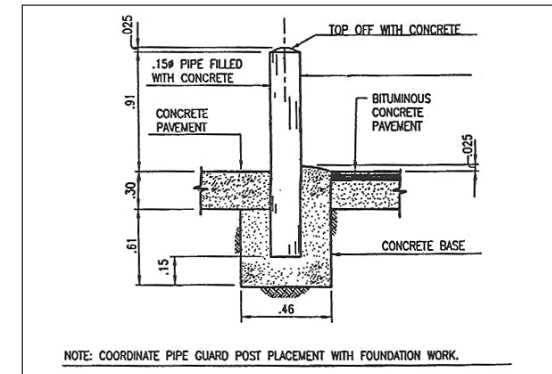
- 1) All metallic structures, equipment, components, parts, etc. shall be provided with adequate protective coatings. All protective coatings and surface treatments shall be clearly described in the specifications and reference Italian standards.
- 2) Existing and new metallic pipelines (water and fuel underground tanks) shall be provided with cathodic protection in accordance with Engineering Technical Letter ETL 91-6.
- 3) Perform a soil pH and resistivity survey prior to the design of systems for cathodic protection and corrosion control.
- 4) At each facility, external metallic pipes shall be separated from internal distribution with a 2000V insulation joint. All jointing, flanging, and bolting of metallic components shall be performed.

11.5.0 Sewerage & Drainage Systems

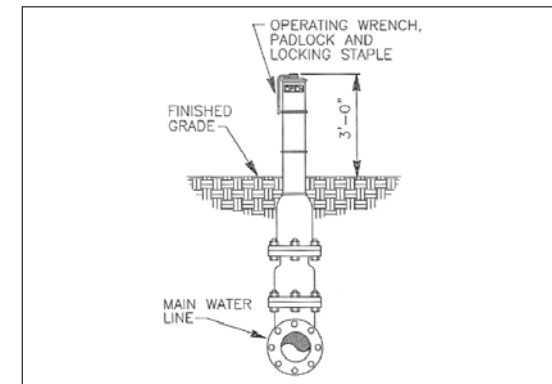
- 1) Sewerage lines shall be connected to the base-wide sanitary sewerage system.



Minimum separation between sewer and water lines



Standard protective bollard



Standard gate valve with indicator post detail

CHAPTER 11 – CIVIL DESIGN

- 2) Roof drains shall be connected to dry wells rather than to either the Base sanitary sewers system or discharged directly onto roads. Include a dry well detail in the construction drawings.
- 3) Storm water on all asphalt or concrete paved vehicle parking surfaces shall be collected and treated by oil/water separators (OWS) and dry wells — do not connect the OWS outflow to the Base sanitary sewerage system.
- 4) Each project must provide its own storm drainage seepage pits and OWS. Connection to the existing Base roadway storm water system that is not equipped for individual facility storm water drainage is prohibited.
- 5) Discharge of Industrial Waste Water (IWW) into the Base sanitary sewerage system is prohibited. The Aviano municipal sewerage plant cannot accept Base IWW flows.

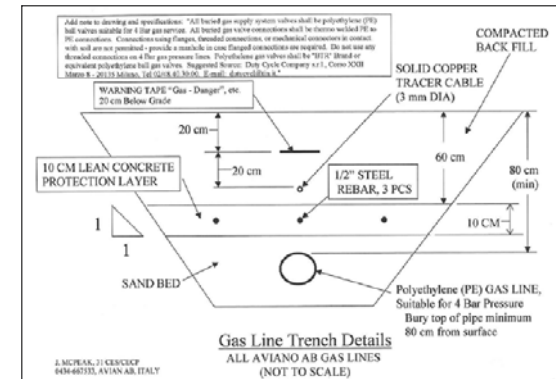
11.5.1 Oil Water Separators (OWS)

Oil/water separators shall consist of a baffled oil/water separator and seepage pits (dry wells). Separators shall be provided with pre-decantation chamber and sampling manhole before the seepage pit. Seepage pits shall be designed using a one-hour, ten-year storm event of 41 mm/hr.

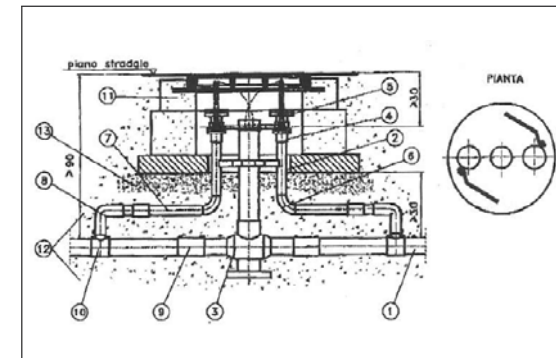
11.6.0 Natural Gas Distribution

Aviano AB is currently converting to natural gas. All new natural gas (methane) systems shall conform to the requirements listed below:

- 1) All gas distribution lines and components shall be suitable for 5 bar operating pressure.
- 2) Provide Polyethylene (HDPE) below grade gas distribution lines conforming to UNI 4437 Series S 5 for gas system up to 5 bar working pressure.
- 3) Base gas main distribution lines shall be 160mm diameter (PE) minimum.
- 4) The A/E shall size branch lines to individual boiler rooms as required for the individual facilities.
- 5) All underground connections shall be thermowelded — no buried flanges will be permitted.
- 6) HDPE piping shall not be permanently exposed to direct sunlight.
- 7) Provide only steel piping for gas lines above grade.
- 8) New gas pipelines shall be installed at least one meter from telephone and medium voltage electrical lines and at least 60 cm from low voltage electrical lines.
- 9) Provide plastic warning tape, marked “Danger-Gas”, “Pericolo-Gas” etc. above all main and branch lines.
- 10) Provide 3 mm-diameter minimum solid copper tracer cable directly above all buried gas lines. Tracer cable shall be terminated above ground at all valves and regulators for easy attachment of tracer signal generator by shops.



Typical gas line detail



Standard natural gas valve box

- 11) Provide a 10 cm concrete protective layer reinforced with three 1/2" steel reinforcing rods over main gas lines and the smaller branch lines to boiler rooms.
- 12) Provide seismic gas shut-off valve at curb for Base Fire Department at each facility
- 13) Provide valve boxes with cast iron cover marked “Gas” and “Metano.”

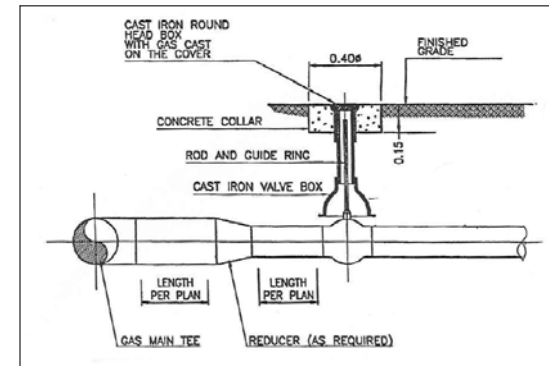
CHAPTER 11 — CIVIL DESIGN

- 14) HDPE ball valves shall conform to ANSI (ASME) B.1640, 1985 (R1994) for gas systems, up to 5 bar working pressure, polypropylene ball, no flanges, suitable for electro-welding installation.
- 15) Install direct buried, 5 bar HDPE ball valves (including release valves) and associated rods, keys, and cast iron covers.
- 16) Install gas leakage detection and alarm system in boiler rooms in accordance with Base standard as described in Chapter 10 — Fire Protection.

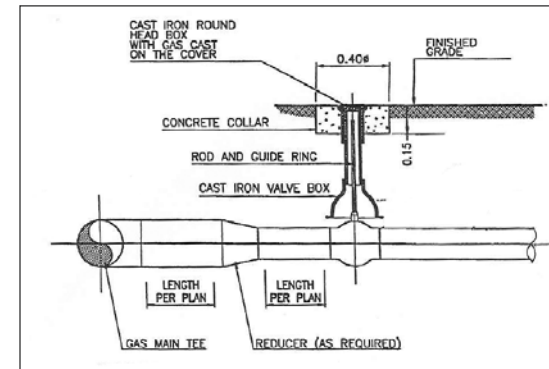
11.6.1 Gas Meters

- 1) A gas meter is required at each facility in accordance with DoD, AF, and Navy criteria for new facilities.
- 2) Provide a lockable stainless steel gas cabinet marked "Metano" for all facilities. Cabinet shall contain the gas meter, pressure regulator apparatus, isolation valves on input/output sides, filter, seismic shut-off valve(s), pressure gauges w/isolation cocks on input and output side of pressure regulator, and external emergency shut-off valve on side of cabinet (See sketch). An overpressure escape valve and vent shall be provided for the cabinet.
- 3) If the gas supply line from the gas main is 2" inside diameter (63mm OD) or larger, Provide parking protection bollards around all gas cabinets.

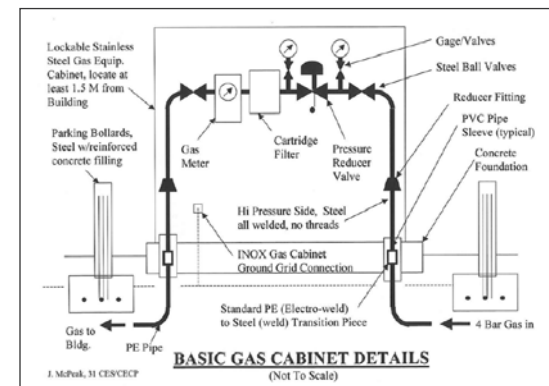
- 4) Typically the facility gas cabinet shall be located at least 1.5 meters from the facility and a minimum of 7 feet away from any roads, parking lots or driveways. However, if the gas supply line is less than 2" inside diameter (63mm OD) then the gas cabinet may be located on the wall outside the facility mechanical room.
- 5) Cabinets shall be vented and prevent ingress of rainwater and birds.
- 6) Cabinet frame shall be grounded. Indicate grounding connections on drawings. Add reference note for grounding grid for gas regulator cabinet.
- 7) A concrete foundation shall be provided for the gas cabinet.
- 8) The center of the cabinet concrete base shall be filled with 15 cm of clean gravel — anodeless gas risers shall not be encased in concrete.
- 9) Electro-welded PE connections shall be used below grade on gas lines — no buried flanges or mechanical connections shall be used below grade or on high-pressure side (5 bar) delivery side of the pressure regulator.
- 10) All transitions from polyethylene to steel piping (above ground only) must use an anodeless riser transition piece. Absolutely no threaded connections shall be used on the high-pressure side of gas supply system.
- 11) The cabinet gas train shall be redundant.



Natural gas branch line to facilities - standard detail



Anodeless riser standard detail



Standard gas cabinet detail

11.7.0 Storage Tanks

11.7.1 Water Storage Tanks

Ground level water storage tanks shall be either buried, bermed or insulated to protect them from freezing.

11.7.2 Fuel Oil Storage

- 1) All storage tanks for Petroleum Oil and Lubricants (POL) products shall be double walled and situated above ground (ASTs) unless approved by the 31 CES/CC.
- 2) Tanks shall include vacuum or nitrogen pressurized type, automatic leak detection systems with local and telealarms, spill and overfill prevention equipment and shall be protected against corrosion.
- 3) Fuel lines shall be above ground. If this is not possible, the fuel lines shall be contained in concrete trenches just below ground level, covered with grates to allow easy inspection for possible leaks.
- 4) Fuel oil fill points must be lockable and have a warning bell to notify personnel filling a tank when it is full.
- 5) A fuel gauge is required to indicate tank level.
- 6) Fuel storage and day tank(s) shall be provided complete with manual and automatic fuel transfer pumps.
- 7) All storage tanks must meet specifications of the HQ USAFE Storage Tank Policy dated August 1994. Tanks in vaults will be considered ASTs.

- 8) All storage tanks must meet Italian Final Governing Standards (FGS).

11.8.0 Roads, Parking Lots and Sidewalks

- 1) All access roads for all new facilities shall have curbs and gutters.
- 2) Paving of roads shall be of standard construction designed for heavy truck loads with at least a 30 cm crushed stone sub-base, 8 cm binder, 3 cm. wearing course and tack coats.
- 3) Dock areas including truck parking and maneuvering areas shall be designed for heavy truckloads.
- 4) All exterior storage shall be paved and designed for forklift traffic.
- 5) Sidewalks shall be of adequate width in relation to use (refer to Chapter 5 — Site Design) and shall have a 15 cm crushed stone sub-base with a 10 to 15 cm reinforced concrete slab. The concrete may have an exposed broom finish or may be finished with concrete pavers on a sand bedding.

References

Chapter 16 — Environmental Standards

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 12 — STRUCTURAL DESIGN

12.1.0 Introduction

This chapter outlines the standard structural design requirements for all new and renovated facilities at Aviano Air Base and its geographically separated units.

12.2.0 General Design Criteria

Structural design and construction shall comply with the criteria below and/or those dictated by DoD and Italian code. Refer to Chapter 19 — Appendix for additional references.

12.2.1 Design Loads

Aviano Air Base is located in a seismic zone classified as S.9 by Italian law — equivalent to U.S. seismic zone 3.

The snow and wind loads used in the design of projects at Aviano Air Base shall be in accordance with the following criteria and references:

- 1) Aviano is located in the North of Italy, Region A, Zone 1.
- 2) Wrinkledness Class = D.
- 3) Category of Exposition = II.
- 4) All design and construction must comply with criteria established by the applicable Italian standards and local regulations.
- 5) The above requirements shall be evaluated against the latest version of the American Society of Civil Engineers, “Minimum Design Loads for Buildings and Other Structures”. The more stringent of the criteria shall be followed.

12.2.2 Soil Profile

The base lies within the upper-medium plains of Pordenone in the piedmont zone facing the northeastern boundary of the Pre-Alps. The A/E is required to perform a geotechnical investigation for the design of any new facility on Base. However, regional geological trend of geophysical investigations has usually identified the following characteristics:

- 1) The area is comprised of layers of coarse to medium gravel, approximately 100 meters thick, interbedded by lenses and layers of fine materials such as silt, sand, and clays.
- 2) The fine-grained formations generally comprise less than 10% of the entire geological formation.
- 3) During excavation, cobbles and boulders will likely be encountered.

12.2.3 Subsoil Conditions

- 1) The natural consistency and stratigraphy of the top 1.5 meters of subsoil at various areas around the Base has been largely altered due to numerous excavations performed during the modification and upgrading of the Base utilities through the years.
- 2) Topsoil, humus, clay, concrete blocks, debris, etc. may be found intermixed with the original subsoil materials.



Reinforced concrete structure in progress in Zappala Area

CHAPTER 12 – STRUCTURAL DESIGN

- 3) Soil borings and laboratory testing of soil samples shall be performed to collect all data required prior to the design of new structures.

12.2.4 Water Table Depth

- 1) The water table depth varies from between 85 meters to 95 meters below the ground surface.
- 2) Water table depth shall be verified during the geotechnical investigation.

12.2.5 Frost Depth

- 1) All exterior foundations shall bear a minimum of 60 cm below grade to ensure that they are supported on a soil substrate not influenced by freezing.
- 2) Utilities shall be designed and detailed in a way that eliminates the risk associated with the soil frost depth of 60 cm below grade.

12.3.0 Structural Systems

- 1) Structural systems shall comply with all applicable DoD and other government criteria and guidance.
- 2) Structural systems shall conform to industry standards and shall use commonly accepted methods of practice.
- 3) When selecting an appropriate structural system, the following elements shall be evaluated and addressed:
 - a) Quantify the total life cycle cost effectiveness of the structural system.

- b) Review the design for constructability.
- c) Determine the experience level of the local contractors and labor force.
- d) Consider the existing and projected bid climate in the area.
- e) Verify the availability and use of local materials.
- f) Consider the opportunity to incorporate sustainable design features into the system design.

12.4.0 Foundations

The average design soil load bearing capacity for the base is 2.0 to 2.5 kg/square centimeter based upon previous design and construction experience in the area. The A/E shall confirm the soil bearing load capacity at the project site prior to beginning design.

- 1) The concrete used for foundations shall be a minimum of concrete class $R_{ck} = 300$ (kg/cm²).
- 2) Base facilities are normally constructed on continuous foundations. Deep foundation systems should be evaluated when large loads are being distributed to the soil mass or when the floating slab approach cannot achieve the desired support requirements.
- 3) Foundations constructed on fill shall be designed to keep overall settlements to less than 25 mm and differential settlements to 12mm.



Reinforced concrete and structural steel construction



Rebar and formwork execution in progress

12.4.1 Geotechnical Report

The geotechnical report shall be performed by the A/E and prescribe foundation requirements for new project facilities. These requirements shall include but are not limited to the following design parameters:

- 1) Define bearing values for alternate foundations systems (i.e., drilled pier, spread footings, etc.), along with settlement characteristics for each system.

CHAPTER 12 – STRUCTURAL DESIGN

- 2) Define the expansion characteristics of the soil.
- 3) Define active (unrestrained conditions), at-rest (restrained) and passive earth pressures. Acknowledge an increase in allowable earth pressure values for seismic and wind loads.
- 4) Define the shear strength characteristics of all soil layers. Laboratory shear testing should be performed on undisturbed samples of cohesive soils and in-situ testing (SPT, CPT, etc.) should be performed on cohesionless soils.
- 5) Define the sub-grade preparation and modulus of sub-grade reaction for slabs on grade.
- 6) Consider any unique site conditions such as existing structures, septic tanks, old fill, certified fill, perched water table, etc.
- 7) Address potential drainage problems that may influence the structural design.
- 8) Make recommendations regarding inspection of foundations.
- 9) Define the seismic parameters required by the Italian regulations and ASCE 7.
- 10) Define the depth of frost penetration.
- 11) Make recommendations for special types of cement for concrete on and below grade.



Youth Activity Center site in Area A1

12.5.0 Floor Slabs

- 1) The concrete used for floor slabs shall be a minimum of concrete class $R_{ck} = 300$ (kg/cm²).
- 2) The concrete used for the sub-base shall be a minimum of concrete class $R_{ck} = 150$ (kg/cm²) lean mix concrete.
- 3) Italian regional and Aviano municipal law requires that there must be a minimum clearance of 20 cm between the bottom of slabs of occupied spaces and the ground below.
- 4) The cavity below slab shall be naturally ventilated to prevent radon infiltration into the buildings.
- 5) The ventilated space below slab shall be built by using the prefabricated interconnecting modular plastic dome assembly system. The system is locally referred to as the “igloo” system and is typically used in the Friuli region.

References

Chapter 11 — Civil Design for earthworks

Chapter 16 — Environmental Standards for acceptable radon levels

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 13 — MECHANICAL DESIGN

13.1.0 Introduction — Base Mechanical Systems

This chapter outlines the standard mechanical system requirements for all new and renovated facilities at Aviano Air Base. All mechanical installations must comply with applicable DoD and Italian codes and the standards referenced in Chapter 19 — Appendix.

Standardization of mechanical equipment is essential for maintenance, reliability, and compatibility for established utility connections, as well as for service utilities upgrade projects. All operating devices, materials, and equipment shall be designed and installed to minimize energy consumption, maintenance, repair, and operational requirements.

13.2.0 General Guidelines

- 1) Maximize passive design features to reduce the size and cost of mechanical equipment.
- 2) Conceal internal utility distribution lines. Outlets and switches must be flush mounted (not surface mounted) in administrative, residential and public use facilities (libraries, clubs, etc.). Surface mounted outlets and switches are permitted only in service and utility areas.
- 3) Boiler room design shall comply with all applicable Italian codes and regulations. All boiler room equipment shall bear the CE mark.
- 4) Contractor shall provide all the documentation, certificates and declarations required by Italian laws.

13.2.1 Operating & Maintenance (O&M)

ETL 89-2 furnishes a general guideline for systems and equipment operation. The contractor shall provide maintenance and repair manuals following installation and testing of equipment.

- 1) The A/E shall allow sufficient accessible space for the safe removal, replacement, inspection, and maintenance of all installed equipment including valves, controls, and filters.
- 2) All special tools and spare parts required for the first year of operation shall be provided as part of the project.
- 3) All installed equipment shall have two sets of operating and maintenance manuals (both in English and Italian) as a deliverable during the facility acceptance.
- 4) Mechanical rooms shall have wall mounted storage for one set of the manuals.
- 5) Training of O&M personnel for the operation and maintenance of all highly specialized equipment shall be included in the project specifications.

13.3.0 Plumbing

13.3.1 Backflow Prevention

- 1) Backflow prevention devices shall be provided on all of the following:
 - a) Facility main water lines;
 - b) HVAC water make-up lines;
 - c) Facility Fire Protection System water lines.



Typical boiler room detail

CHAPTER 13 – MECHANICAL DESIGN

- 2) Check valves are not acceptable (as a stand-alone device) for back flow prevention.
- 3) The A/E shall include in the plumbing, HVAC, and mechanical drawings all symbols, details, and requirements for backflow prevention devices on facility main water line.
- 4) Backflow devices for water supply ½" to 4" shall be Watts brand, Model 909 RPPD or approved equal.
- 5) Backflow devices for fire systems 4" and above shall be Ames brand, Model 2000SS or approved equal.
- 6) Back-flow prevention devices suitable for fire water and Hi-X Foam systems shall be in accordance with UPC, IPC etc. A swing check valve only is not adequate for Fire Protection. Device must be located inside of the mechanical room. Include requirements and detail in drawings.
- 7) A reduced Pressure Principle Back Flow Prevention Device is required if glycol or other chemical is used in the fire protection system.

13.3.2 Floor Drains

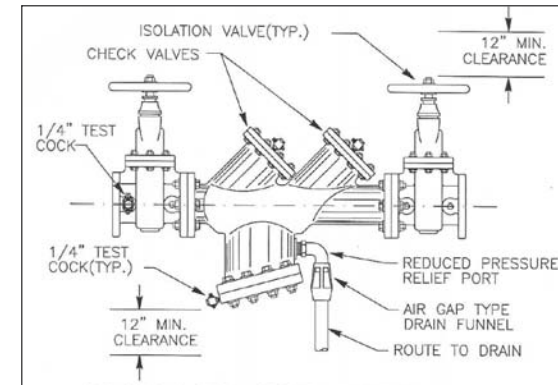
New construction and renovation projects must meet the following requirements where production of wastewater from industrial activity is expected:

- 1) No floor drain will be provided in rooms, bays, canopies and any other areas to be utilized in the process of production, maintenance or any other industrial activity. Technical rooms (i.e. boiler rooms, mechanical rooms, equipment rooms) must be included in this category.

- 2) If a floor drain is essential for operations, the drain shall be connected to an above ground collection tank. The tank shall conform to requirements outlined in the following section.
- 3) Floor drains are permitted in rooms where normal "domestic" activities are taking place, i.e. bathrooms, lockers rooms, kitchens, offices. These drains must be connected to a sewer line or where not available, to a septic tank.

13.3.3 Holding Tanks

- 1) The holding tank, used when systems are drained for maintenance and for glycol/water, shall have a capacity of at least 120% of the served piping (i.e. if the facility chilled water system holds 400 liters, the holding tank must be at least 1.2 x 400 or 480 liters).
- 2) Multiple holding tanks for sprinkler water, chilled water, etc., shall be provided as necessary depending on the facility.
- 3) Holding tanks shall be located outside the boiler/mechanical/pump rooms.
- 4) The Base PM shall confirm the use of chemicals, tank size and number requirement per project with the project A/E.
- 5) The subject system drain may connect to a drywell if there is no glycol or other toxic chemical used in the water/sprinkler system.
- 6) Water/glycol from HVAC/Sprinkler holding tanks shall be pumped out and sent off base for treatment.



Standard backflow preventer detail

13.3.4 Water Softeners

The Aviano Air Base water wells supply very hard water. According to AFM 88-10 Vol.1, 200-300 mg/l of calcium carbonate (Ca CO₃) found in water constitutes Very Hard Water. The Aviano Air Base water supply averages approximately 290 mg/l of Ca CO₃.

- 1) Only softened water with hardness below 150mg/l CaCO₃ shall be provided to Base boilers, domestic water supplies and hot water heating systems as make-up water.
- 2) Provide automatic volumetrically controlled type (not hydro-pneumatically) water softeners for all new facilities and renovation designs.
- 3) The water softener shall have an automatic disinfecting device, mixing valve, regenerating salt accumulation tank, ions and salt exchanger resins, flexible fittings, automatic by-pass, gauge and electrical connections.

- 4) High capacity domestic water softeners, industrial and semi-industrial type are required for all new Base dormitories, lodging facilities, large laundry facilities, industrial aircraft and vehicle wash racks (make-up water only), schools, medical treatment facilities, dining facilities, clubs, fitness centers, large kitchens, and any other facilities with high domestic hot water demands. Carefully plan for adequate floor space to install and maintain these large, high flow water-softening systems in designated mechanical rooms.
- 5) Low capacity, commercial type domestic water softeners are required for all new and renovated Base facilities not requiring industrial water softening treatment. These small water softeners serve the boiler make-up line and a few sinks and showers in smaller facilities with low domestic hot water demand. The water softener shall be sized for the larger of the 100% HVAC system make-up or the domestic hot water demand. Commercial water softeners will generally have a small footprint and lower cost than the industrial type high flow systems required for kitchens and dorms and can easily be located in facility boiler rooms or mechanical rooms. The water softener should be placed on the main building water feed to treat all incoming building water.

13.3.5 Cold Water Distribution

- 1) For cold water systems, pipes shall be segregated and insulated to avoid temperatures above 20 °C (68 °F).

- 2) In accordance with CEI norm 64-8, water piping (cold, hot and heating) shall not be installed above electrical conduit or electrical equipment.

13.3.6 Hot Water Distribution

- 1) Facility domestic hot water tank temperature should not be maintained at less than 60 °C (140 °F) to prevent the growth of deadly Legionella bacteria in all facility domestic hot water systems. The hot water delivery temperature at the hot water mixing valve for sinks and shower heads shall not be less than 50 °C (122 °F). Keep hot water distribution supply between 50 - 60 °C at all times.
- 2) Gas fired water heaters or gas fired instantaneous point of use domestic hot water heaters shall be provided in lieu of electric water heaters for new facility construction and renovation projects. Gas water heaters generally provide a heat source at the bottom of the tank, which prevents the formation of Legionella bacteria.
- 3) Provide anti-scald thermostatic mixing valve(s) to reduce water temperature at the source, not in the tank or distribution lines, at facility sinks and showers.
- 4) Insulate all hot water pipes.
- 5) Except where gas boiler heat is used, locate the hot water tank as close as possible to the location of the end use. Small, under-counter, on-demand, water heaters are efficient for locations where large capacity is unnecessary.



Typical mechanical systems detail

CHAPTER 13 – MECHANICAL DESIGN

- 6) Hot water is required in men's and women's rest rooms, janitors' closets, and showers.

13.3.7 Toilets

- 1) Lavatories in public restrooms shall be equipped with flow limiting devices that limit maximum flow to either 0.5 gpm, 0.75 gpm if device limits period of water discharge, or 2.5 gpm if equipped with a self closing valve.
- 2) Cisterns for toilets and urinals should be provided with internal overflows (similar to US designs). If external overflows are used, they must be inconspicuous both internally and externally.
- 3) Urinals should be controlled with cisternmise or equivalent. Fixtures employing continuous-flow devices are prohibited.
- 4) Water taps must be of the mixer type (before exiting the faucet) with hot supply on the left and cold supply on the right.
- 5) Backflow prevention may be incorporated into sink design where separate devices will not be needed. Exceptions may be made for janitorial sinks, where usage is minimal, and small hot water tanks may be used.
- 6) Self-rimming, vanity type lavatories shall be used in lieu of individual freestanding porcelain sinks where more than one is provided in a toilet area.
- 7) Showers must be individually adjustable for temperature pressure, at 2.75 gpm flow with spring time shut off and fixed spray head (adequate pressure must be ensured), and direction.

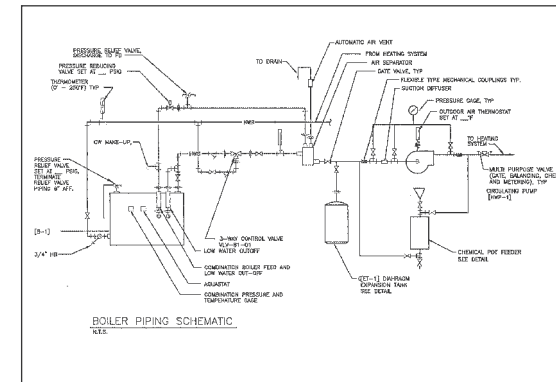
- 8) All fixtures shall be white in color.

13.3.8 Drinking Fountains

- 1) Built-in recessed water drinking fountains shall be provided in suitable numbers and locations for the expected occupancy of the facility.
- 2) In new facilities at least one drinking water fountain will be provided on each floor in buildings occupied by ten or more personnel.
- 3) Refrigerated water fountains are difficult to maintain and should not be specified.

13.4.0 Heating, Ventilation & Air Conditioning

- 1) The Heating, Ventilation and Air Conditioning (HVAC) system shall be a multi-zone or VAV system to accommodate the various functional areas of the facility.
- 2) The use of individual room fan coil units shall be strictly limited to areas requiring a high level of control due to unique activities or when the location of the area requiring conditioning is far from the central ducted air-conditioning system.
- 3) Air dehumidification and humidification equipment is authorized only where justified by the installation of special equipment and performance of critical operations. The use of DX equipment is highly discouraged.



Boiler piping schematic

- 4) When packaged HVAC units are specified, the designer shall ensure that the unit and all ductwork entering and exiting the facility connecting to the unit are completely screened from view. If this is not possible the A/E shall select an alternative solution to meet the HVAC requirements of the facility.
- 5) The A/E shall specify programmable thermostats.
- 6) HVAC equipment installed above suspended ceilings shall have double condensate drain pans.

13.4.1 Seismic Design Criteria

All mechanical equipment shall be anchored, supported, and braced in accordance with the stricter of Army Corps TI 809/04 and TI 809/05 or the Italian seismic design code. Refer to the recommended website in Chapter 19 — Appendix.

13.4.2 Location of Exterior Equipment

- 1) Locate above-grade utility connections, vents, and other building projections away from high visibility areas. Do not locate utility projections, such as air conditioning units, on the street side of a building.
- 2) Flush wall louvers are preferred to protruding devices and shall be painted the same color as the surrounding wall. Every effort shall be made not to locate wall louvers near entries or on primary wall elevations.
- 3) HVAC air handlers for new and renovated facilities shall be installed inside all facilities. Dedicated air handler room(s) shall be provided. No facility air handlers or ductwork shall be installed on the outside any Base facility.
- 4) Mechanical intake and exhaust devices should not be mounted on roofs. In instances where no alternative is available, the equipment shall be screened by mansard-type roofs or grills which are the same color and material as the surrounding roof. Place roof-mounted equipment on the slope facing away from primary pedestrian areas.
- 5) Air conditioning equipment installed on roofs shall be protected from hail and rain. Equipment installed on roofs shall be connected to the lightning ground protection system.

13.4.3 Penetrations at Fire Rated Walls

- 1) Penetrations through fire-rated concrete floors and walls shall be made with pipe sleeves that meet all code requirements.

- 2) All penetrations shall contain fire stopping with a fire rating equal to that of the area being penetrated. Details shall be included in project drawings.

13.4.4 Fire and Smoke Dampers

- 1) Show fire and smoke dampers and details at all fire-rated walls on project drawings.
- 2) Show balancing dampers on HVAC ductwork. Provide a detail where necessary to clarify construction.
- 3) Provide access door(s) in ductwork for maintenance and resetting of all dampers.

13.4.5 Vibration Control

All equipment producing a high level of vibration (i.e. emergency generators and compressors) shall be adequately insulated from facility structures.

13.4.6 Mechanical Rooms

- 1) Boiler burners shall be gas fired where natural gas mains are available and fuel oil fired where gas mains distribution is not yet complete.
- 2) Gas “sniffer” leak detection sensor systems are required in boiler rooms. In the event of a detected gas leak in boiler room the system shall automatically close gas lines, sound an alarm, and alert both the Base Fire Department as well as the occupants. Refer to Chapter 10 - Fire Protection for further Gas Detection and Alarm System information.

- 3) Provide stainless steel vent stacks (flues) for boilers to accommodate future gas exhaust. Vent stacks shall be concealed in a chase for aesthetic purposes.

- 4) Mechanical room access shall be provided from the exterior of the facility. An additional interior access shall be provided wherever possible. Exterior access doors, access walkways and access roadways shall be large enough to permit removal of the largest piece of mechanical equipment. All doors shall be provided with a security mechanism.

- 5) Adequate utility roadways and walks shall be provided to ground level mechanical rooms.

- 6) Air conditioning equipment including air handlers, compressors, pumps, and associated equipment shall be installed at ground level where possible. When dictated by necessity, HVAC equipment may be installed in attic spaces, above suspended ceilings and roof mounted with proper screening.

- 7) Adequate access, floor space and protections shall be provided for safe maintenance of equipment.

13.4.7 Generator Rooms

- 1) The fuel source for generators shall be natural gas wherever gas mains are available.
- 2) The floor of the generator room shall be leak-proof and impervious to diesel fuel.
- 3) The door stoop shall be raised approximately 15 cm above the finished floor.

CHAPTER 13 — MECHANICAL DESIGN

- 4) All electrical and piping floor penetrations shall be impermeable to generator oil and fuel in the event of a leak.
- 5) The generator fuel feed system shall be configured to automatically shut off when the generator is not running in order to prevent continued cycling of the fuel pump.

13.4.8 Chemical Shot Feeders / Boiler and HVAC System Water Treatment

- 1) Boiler water chemical shot treatment feeders are required for all new boiler and HVAC cooling systems along with the initial chemical charge.
- 2) A boiler make-up water analysis is required for all new boiler water systems. The services of a qualified water treatment consultant are required to provide specific system recommendations.
- 3) Ensure that the initial boiler water make-up water and chemical treatment are provided for by contract in accordance with the boiler manufacturer's recommendations.
- 4) Required backflow prevention requirements shall apply.

13.4.9 Meters

- 1) Meters will be installed in all new and renovated buildings to monitor energy consumption.
- 2) Provide utility meters in accordance with ETL 94-2.
- 3) Meters will be mounted on the exterior of the building where practical.

- 4) All utility meters (water, gas, electric) shall be adaptable for use with a future remote metering system.
- 5) All meters shall be connected to the facility Comm Room or Comm Panel as per the requirements of Chapter 11 — Civil Design.
- 6) A direct digital controls system shall be specified to control and monitor the HVAC system.
- 7) Systems for large facilities shall have the capability of future connections to a centralized energy monitoring and control systems (EMCS) and shall conform to the Base metering design standards. (Refer to Chapter 14 — Electrical Design for EMCS standards).
- 8) Provide impulse type meters and conduit.

13.5.0 Heating

- 1) Heat pumps shall be used on a limited basis since they have proven to be unreliable and difficult to maintain.
- 2) The use of electric resistance heat is prohibited.
- 3) Large open bay areas shall have natural gas radiant heating where appropriate. All other areas shall have natural gas, hot water heating systems wherever available.
- 4) If natural gas is not available, fuel oil hot water heating systems shall be used.
- 5) Radiators, if used, shall be concealed and must be thermostatically controlled.



HVAC diffuser



Circular section ductwork



Typical HVAC ductwork connections

- 6) The inside heating design temperature for personnel comfort shall be 20°C (68°F) for administrative (inactive employment) and living areas, 13°C (55°F) for working areas (active employment), and 4.4°C (40°F) in storage areas for the prevention of freezing.
- 7) Warehouse facilities for the storage of materials not subject to freezing should not be heated.

13.6.0 Ventilation Systems

13.6.1 Air Intakes

- 1) All HVAC intakes shall be located at least 3 meters above the surrounding ground/floor level.
- 2) Show roof-mounted ductwork and intake/exhaust ductwork details. Provide adequate separation of intake from exhaust to ensure the system is not “short circuited” (i.e. exhausted air is drawn into air intakes). Provide exterior duct runs, goosenecks, etc. to ensure fresh air intake is maintained at all times.
- 3) Do not locate air intakes near diesel exhausts, sewer vents, industrial shop exhaust vents, etc.
- 4) Provide insect screens at all intake/discharge ducts.

13.6.2 Electronic Filtering

Consider providing an electrostatic filtering system for dust and smoke in mechanically ventilated heating and/or air conditioning systems.

13.6.3 Toilets

- 1) Venting of latrines shall meet plumbing and mechanical code requirements.
- 2) A mechanical air extracting system that complies with the exhaust rate established in the most recent ASHRAE ventilation standard shall be provided for all toilets.

13.6.4 Kitchens

Hooded vents in cooking areas shall be the integral make-up air type capable of introducing approximately 80% of exhaust air requirements.

13.6.5 Industrial Facilities

All industrial ventilation systems designed to protect workers from airborne contaminants shall be designed according to the guide, “Industrial Ventilation: A Manual of Recommended Practice, latest edition, American Conference of Governmental Industrial Hygienists.”

13.7.0 Air-Conditioning

- 1) Weather conditions and site-specific factors such as noise levels have made air-conditioning a necessity at Aviano Air Base. Air conditioning is authorized for all types of facilities normally requiring cooling as defined in MIL-HDBK-1190.
- 2) The inside design temperature for personnel comfort for air conditioned facilities shall be 9.4°C (15°F) less than the 2½ percent outside dry bulb weather conditions. However, this shall not exceed 25.6°C (78°F) dry bulb or be less

than 24°C (75°F) dry bulb. The design relative humidity shall be 50 percent minimum or the design temperature equal to the outside air dew point design temperature, whichever is less. The minimum outdoor air supply rates for all facilities shall be according to the current ASHRAE ventilation standard.

- 3) Communication rooms shall have a dedicated air conditioning system. Maximum temperature allowed in this room shall be 24°C (75°F) at 30-55% relative humidity. A positive pressure is required.

References

Chapter 11 — Civil Design for utilities and meter requirements.

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 14 — ELECTRICAL DESIGN

14.1.0 Introduction

This chapter outlines electrical requirements that shall apply in addition to the applicable US and Italian codes at Aviano Air Base. Refer to Chapter 19 — Appendix for additional references.

14.2.0 General Requirements

- 1) All installed electrical equipment, materials, and systems (both new installations and modifications to existing) shall comply with US and Italian laws, norms, and local regulations. All equipment and materials shall bear the Italian mark of quality “IMQ” and the European Community mark “CE”. Italian laws, codes and local regulations shall govern in case of conflict with US regulations.
- 2) Project design, testing for acceptance, certifications, and compliance certifications shall be signed and sealed in accordance with applicable Italian laws, norms, and local regulations. Certification shall be provided in addition to any other specific contractual obligations.
- 3) Base primary distribution is underground, 20,000 Volts, 3 phase, 3 wire, at 50 Hz. Primary voltage is stepped down at substations, or at the facility, via 20,000V - 380/220V transformers. The secondary distribution system is a TN-S, 3 phase 5 wire system. Unless authorized by the Base Civil Engineer, no 220/120V systems may be installed and under most circumstances the existing 220/120 systems shall be replaced with the Base standard 380/220V distribution.

- 4) The A/E shall collect all available data needed for the project design at the time of the site survey.
- 5) The A/E shall verify that the Base power supply has adequate capacity to supply new and proposed facilities and associated equipment.
- 6) Coordinate the design with 31 CES/CECC and the Base Electrical Engineer.

14.2.1 Project Document Requirements

Project documents shall include the following:

- 1) Detailed planimetric diagram (grounding, lightning protection, lighting, corrosion control, electrical system)
- 2) Detailed one-wire diagram (grounding, lightning protection, lighting, corrosion control, electrical system)
- 3) Detailed structural arrangement (grounding, lightning protection, corrosion control, electrical system)
- 4) Internal Light System calculation.
- 5) External light calculation in accordance with security forces regulations.
- 6) Conductor thermal and voltage drop calculations.
- 7) Cable types description.
- 8) Lightning protection system evaluation and calculation.
- 9) Ground system evaluation and calculation.
- 10) Equipotential connection.
- 11) Power factor corrector calculation.



Electrical switchgear

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- 12) Transient Voltage Surge Suppression installation evaluation.
- 13) Emergency light system evaluation and calculation.
- 14) Lighting requirements for perimeter, parking areas, exterior building illumination, doors, and permanently restricted areas.
- 15) Detailed installation description of all equipment and materials.
- 16) Renovation projects shall include the removal of all existing redundant electrical components.
- 17) Reliability and maintainability design checklist.
- 18) The A/E shall indicate which tests must be performed for individual electrical components as well as the global system. Individual components shall be tested while the global system is functional.

14.2.2 Meters

- 1) Energy meters / line analyzers shall be installed for all new/upgraded buildings to monitor energy consumption and power supply characteristics. Energy meters / line analyzers shall be installed on all system feeders.
- 2) All facilities shall be pre-wired for Energy Management Control Systems (EMCS). All controls are to be EMCS compatible with associated telemetry and connection to EMCS computer, if applicable.

- 3) Meters shall be installed in substations and shall be meter/line analyzer type with telemonitoring capacity. Electrical meters shall be installed in the low voltage, main distribution panels in accordance with ETL 94-2 and DOE 435, par. 10.3.
- 4) Meters shall be capable of being read onsite at the unit as well as remotely from the common Base telemetering/monitoring distribution system.
- 5) All meters shall be connected to the facility Comm Room or Comm Panel as per the requirements of Chapter 11-Civil Design.

14.2.3 Standby Power

Automatic backup generator(s) may be required (IAW AFH 32-1084 for essential facilities) to ensure continuity of operations. Coordinate any specific requirements with the user and 31 CES/CEC.

- 1) Natural gas shall be the fuel source for generators where gas mains are available.
- 2) The generator set shall have a control panel mounted on the unit and an autostart and transfer system complete with manual/automatic controls. Maintenance bypasses shall be installed in a segregated section of the LV main distribution panel. The autotransfer panel shall ensure that the generator will never be able to be paralleled with the commercial supply. Generators shall be isolated to reduce ambient sound levels to below 80 decibels, A-weighted (dBA).

- 3) The upstream and downstream circuit breakers of the autotransfer system shall be draw-out type to permit maintenance of the backup systems under insulated conditions while the commercial supply is energized.
- 4) Autostart transfer panels shall be provided with adequate bypass for maintenance and repair.
- 5) Fuel storage and day tank(s) shall be provided, complete with manual and automatic fuel transfer pumps and leak detection systems. Refer to Chapters 11 and 16 for additional information.
- 6) A mobile back-up generator with external outlets shall be provided for all mission essential and critical facilities as determined by 31 CES/CECC. A manual I-O-II commutator shall be provided in the LV main distribution panel for standby/O/ commercial power supply switch over.
- 7) Double and disconnecting switches shall be installed in the facility main distribution panel. Provide a receptacle/plug to match Base standard.
- 8) All low voltage transformers shall have two +/-2 x 5% primary volt taps for voltage adjustment.

14.2.4 Grounding

- 1) All equipment, metallic masses, and concrete reinforcement, etc. shall be grounded in accordance with applicable Italian laws and norms.
- 2) Grounding dispersion system and main wiring connections shall be calculated in accordance

with Italian laws. All facility grounding dispersion systems shall be loop type.

- 3) A single large MV and LV grounding dispersion system shall be provided for all areas of Aviano Air Base. All substation grounding dispersion systems shall be interconnected without the interposition of any disconnecting device to form a large, single grounding dispersion system.
- 4) All facility grounding dispersion systems shall be connected to the grounding dispersion system of the substation supplying the facility.
- 5) The dispersion system interconnection wires shall be installed above all MV and LV cable ducts.
- 6) The grounding systems shall be designed to minimize the installation of circuit breakers with ground fault protection.
- 7) Fencing gate pillars shall be connected with an equipotential connection.

14.2.5 Lightning Protection System

- 1) All mission essential and critical facilities shall be provided with an external and internal lightning protection system (LPS). The entire facility including the roof, roof components, objects extending above the roof, roof machinery, and antennas shall be considered “volume to be protected”.
- 2) Unless otherwise directed by 31CES/CECC, the A/E shall evaluate risk analysis calculations in accordance with applicable Italian code to determine whether or not an LPS is required for all other facilities.

14.2.6 Anti Surge Protection

- 1) Provide connections for voltage regulation equipment (UPS) to critical equipment (i.e. computer and communications circuits) to prevent unanticipated and damaging fluctuations and to assist in providing clean power to computer equipment. Coordinate requirements for equipment supplied by the end-user.
- 2) The A/E shall analyze the possibility of installing capacitors on the large motor starting and large reactive loads supplying panels to minimize line losses.

14.2.7 Underground Electrical Work

- 1) All exterior electrical lines shall be installed within ductbanks with manholes.
- 2) Electrical components (panels, switchgear, relay, light, transformers, etc.) shall be installed aboveground only. Only cables and cable connections are permitted underground.

14.3.0 Primary and Secondary Power Distribution

Medium voltage (MV) primary and low voltage (LV) secondary main power distribution at Aviano Air Base shall consist of the following characteristics:

- 1) Medium Voltage (MV) distribution: 3PH insulated neutral, single conductor, 24 KV, 50 Hz, type RG7H1OR, insulation shall matching existing.
- 2) Low Voltage (LV) distribution: TN-S, 3 Phase, 5 Wires, in accordance with applicable Italian norms. All renovated or upgraded facilities

shall be converted to TN-S type, 380/220 Vn distribution including those areas of the facility where other work will not be performed.

- 3) Power distribution lines are protected by ductbanks constructed of PVC pipe encased in concrete. Manholes are interconnected with standard copper grounding wire located above the ductbanks.

14.4.0 Substations and Switchgear

Facilities in Areas A1/A2 and F (both Zappala and the Flightline) are served by MV loops with independent ENEL commercial supply and MV/LV step-down substations. The MV protection is composed of overload, short-circuit, and differential pilot wire controlled systems for the cables interconnecting the substations, indirect overcurrent and fault-to-ground for each transformer. All existing protection is selectively coordinated both on MV and LV sides. MV protection shall be accomplished with accelerated logic operating microprocessors equipped relays providing protection and control of substations feeders and of bus bars connections by performing needed metering, protection of local and telecontrol and monitoring, self testing, alarms integrated functions. The relays shall be equal to and coordinated with those existing in the area loops, unless otherwise directed by 31 CES/CECC.

- 1) The A/E must ensure that adequate protection is provided for MV and LV equipment and cables.
- 2) All protection must be coordinated with existing equipment and ensure total selectivity for proper line and equipment disconnects.

- 3) MV switchgear equipment shall be ABB or Merlen Gerin brand or approved equal.
- 4) New MV switchgear shall be equipped with SF6 MV circuit breaker, 24 KV, 630 A, 16 KA.
- 5) New MV/LV transformers shall be cast resin with ventilated mount, $20000 \pm 2 \times 2.5\%$ /380-220 Vn, D/Yn, 220-127Vn secondary only if specifically requested and authorized.
- 6) LV substation switchgear equipment shall be ABB or Merlen Gerin brand or approved equal.
- 7) LV building panels and switchgear equipment shall be ABB, Merlen Gerin or Ticino brand or approved equal.
- 8) New LV switchgear shall be suitable for TN-S distribution (CEI 64-8), 380-220Vn, 50 Hz, 100K AIC power circuits.
- 9) Circuit breakers shall be M16 in accordance with calculations with compact circuit breakers equipped with electronic relays.
- 10) The installation of 220-127Vn panels shall be done only if specifically requested and authorized.
- 11) All main LV switchgear equipment shall be provided with one 3PH energy Meter/Line Analyzer for each distribution breaker including spares.
- 12) All LV transformers shall have two $\pm 2 \times 5\%$ primary volt taps for voltage adjustment. Provide the installation location (LV panels or in separate ventilated enclosure), primary and secondary lines and grounding connections.
- 13) The A/E shall design systems with spare capacity for future expansion.
- 14) New utilities shall include emergency lighting for equipment repair.
- 15) New grounding systems and modifications to existing systems shall include neutral grounding in accordance with Italian laws.

14.4.1 MV/LV Substation Equipment

- 1) MV Switchgear equipment shall have the following characteristics: totally enclosed, self-ventilated, protected, modular, compact type; air insulated; equipped with SF6 circuit breaker and bus bar disconnecting switch. Equipment shall be factory standard products equipped with components produced by the same manufacturer as the enclosure; of a series that allows performance of all schematics of installations related to a standard distribution system. Switchgear equipment shall have maximum operating voltage 24 KV; Insulation levels KV (50Hz/1 min) between phases and to ground 50 KV, on disconnecting 60 KV; Insulation levels KV pick (1.2/50 micro sec) between phases and to ground 125 KV, on disconnecting 145 KV; maximum operating current 630 A; maximum admissible current (KA/1 sec) 16 KA.
- 2) MV/LV transformers shall have the following characteristics: vacuum cast resin insulation, self extinguishing class F/F, with low loss rounded magnetic core, aluminum windings, primary voltage $20.000 \pm 2 \times 2.5\%$ Vn, secondary voltage 380/220 Vn, connection DH11, insulation voltage 24 KV, low vibration,

low noise; factory-equipped ventilated IP 31 steel enclosure, wheels, anchoring devices, thermal protection, prepared for installation of cooling fans, grounding connector and be able to withstand 125 KV, 1.2/50 micro sec, pulse test between phases and to ground.

- 3) LV Main Distribution Panel shall have the following characteristics: Forma 3B, self ventilated, factory standard products equipped with components produced by the same manufacturer as the enclosure. The equipment shall consist of standardized sections based on easy to fit modular design to fulfill any plant configuration, electrical diagram, and installation site; rated insulation voltage 1000 V, rated operating voltage 690 V, rated short time withstanding current 1 sec 100 KA, rated peak withstanding current up to 220 KA, circuit breakers MIC 70 KA, physical degree of protection IP 31, draw out type main circuit breakers, meters/line analyzers on all incoming and outgoing power lines.

14.5.0 Internal Power Distribution

14.5.1 Seismic Design Criteria

All Electrical Equipment shall be anchored, supported, and braced in accordance with Army Corps TI 809-04, Chapter 10.3. Refer to Chapter 19 — Appendix for recommended Army Corps website.

14.5.2 Panelboards

- 1) The fire alarm and electrical distribution main panels shall be housed in a separate room with external access. If this is not possible they shall be installed as close as possible to the main entrance, but adequately hidden by aesthetically pleasing doors or mobile partitions.
- 2) Electrical distribution systems shall be TN-S insulation grade 3 (450-700v) and physically protected for their entire length. Protection shall be IP-40 minimum and IP-54 in wet locations.
- 3) Local distribution 380-220V and, if authorized, 208-120V secondary TN-S distribution panels shall be installed whenever convenient. Panels shall be IP-5G with solid hinged front door.

14.5.3 Wiring

- 1) Separate wiring, grounding, and raceway distribution systems shall be provided for power, lighting, computer dedicated 220v outlets, special purpose outlets, 120V distribution, public address, communication, data security equipment, and fire alarm systems.
- 2) The minimum electrical system insulation after completed installation shall be grade 3 (450-700v).
- 3) Fire alarm cables shall be fire resistant cable type FG10(O)M1 in accordance with applicable norms.
- 4) Cable trays shall be installed complete with covers.

- 5) Junction and pull boxes for different systems shall be identified by letters. The monogram shall be marked on front of covers of all boxes installed above false ceiling. The other boxes shall have monogram on rear of cover. Legend of monograms shall be included in drawings.
- 6) All power supply and distribution shall be oversized by 20% for future systems expansion. New LV distribution shall be 380-220V 3PH 5 wire TN-S CEI 64-8, systems.
- 7) All materials and equipment shall bear the IMQ (Italian Mark of Quality).
- 8) US equipment that is not certified by European norms shall be connected with European Community (CE) certified plugs and outlets.
- 9) Electrical testing equipment shall be certified by the manufacturer and regularly checked by official laboratories in accordance with applicable norms.

14.5.4 Conductor Sizes

Minimum conductor sizes for lighting and power circuits shall be in accordance with Italian CEI, European norms and Aviano Air Base Standards including the following:

- 1) Lighting circuit main distribution lines: 2.5 sq.mm.
- 2) Lighting circuit branch lines: 1.5 sq.mm.
- 3) Outlet circuit distribution lines: 4 sq.mm.
- 4) Outlet circuit branch lines: 2.5 sq.mm.
- 5) Control circuit lines: 1.5 sq.mm.

- 6) Minimum pipe diameter: 20 mm. Physical protection for more than one circuit shall be sized in accordance with CEI norms to allow for wire cooling.

14.5.5 Outlets

- 1) Standard power distribution and outlet installation details may be obtained from 31 CES/CECC.
- 2) Internal utility distribution lines must be concealed and outlets and switches must be flush mounted (not surface mounted) in administrative, residential and public use facilities (libraries, clubs, etc.) except in plant and utility service areas.
- 3) All outlets shall be mounted at 50 centimeters above finished floor unless specified otherwise.
- 4) All outlets for wet locations as well as related circuits shall be IP-54 for physical protection.
- 5) The installation of 400 Hz, 60 Hz, direct current or special outlet requirements requires prior approval of the Base Civil Engineer.
- 6) The installation of 120V, 50Hz requires prior approval of the Base Civil Engineer. Special outlets such as those capable of accepting 15A 120v US standard plugs must be authorized by the 31 CES/CEC. 120V outlets shall be clearly labeled.
- 7) 120V supplied for US, if authorized, shall be provided with 380/208-120V, 50 HZ transformers.

- 8) 220v, 50 Hz power outlets shall be 16A 250v 2 Poles + Ground, protected contact (2.1) with interlocked circuit breaker.
- 9) 220v and 380v 16A or above, CEE type outlets shall be equipped with plug and provided for special purpose power supply.
- 10) General purpose utility 220v 50HZ outlets shall be equivalent to “BTicino” brand and capable of accepting 10A + 16A Italian style plugs and German style plugs.
- 11) Computer outlets shall include, at least 2 each of 16A 250V 2P+ ground receptacles, each mechanically interlocked with 16A 2P automatic circuit breaker protection.
- 12) Domestic and administrative areas shall be equipped with at least one power outlet per wall spaced at intervals of 2.5 meters unless otherwise specified.
- 13) Corridors shall have general-purpose utility 220v 50HZ outlets at six-meter intervals for cleaning equipment.
- 14) All work must comply with Italian laws/norms/ local regulations and U.S. National Electrical Code (NEC).

14.5.6 Accessibility for Disabled Persons

Emergency alarm pull cords shall be installed in handicapped toilets in accordance with Italian regulations.

14.6.0 Lighting

- 1) Photoelectrically controlled security lights with manual override shall be installed outside of all existing and new mission essential and critical facilities. Security lights shall be independent and equipped with quick relighting bulbs.
- 2) Install timed switches, photo sensors, motion sensors, and other devices to automatically switch off lights in unoccupied spaces where EMCS is provided. Use photo sensors to switch off or dim lighting where daylighting has been incorporated into the design.
- 3) Indirect lighting shall be installed in rooms where activity is mostly related to computer use.
- 4) Do not specify incandescent nor halogen lamps in light fixtures except in spaces where the fixture is rarely used.
- 5) Do not specify sulfur lighting systems (fusion/ microwave lighting) as they may cause problems with wireless local area networks.
- 6) Parking or street lighting shall be installed with sodium high-pressure lamps only, maximum 250 watts. Each outdoor lighting system shall be fed with two feeder lines.

14.6.1 Illumination Ratings for Fluorescent Lamps

- 1) All fluorescent tubes shall be Type T5 with light temperature ranging from 2200K for offices and reading rooms to 4000K for general use.
- 2) Fluorescent mercury vapor type tubes are not permitted.

14.6.2 Lighting Fixtures

- 1) The number of individual types of lamps shall be minimized while maintaining sizes compatible with functional requirements.
- 2) Fixtures for general lighting shall be recessed (for suspended ceiling panels 600mm x 600mm) fluorescent with electronic ballast, with high efficiency warm tone fluorescent tubes, capacitors, radio anti-ramming devices and fuses equivalent to “Disano Supercomfort” or “Galassia.”
- 3) Fixtures for wet locations shall be fluorescent type, IP-65, equivalent to “Disano Hydro” with polycarbonate diffuser.
- 4) Special occupancy areas requiring indirect lighting, such as conference rooms, shall be equipped with fixtures with electronic ballasts with dimmers equivalent to “Disano Gabbiano” or “Airone.”
- 5) Fixtures for task lighting shall be spot-type (ceiling recessed whenever possible), equipped with transformer and low voltage quartz lamps.
- 6) Lighting fixtures shall be grouped to allow switching by rows in rooms with more than three fixtures. Energy saving controls shall be considered for all installations.
- 7) For toilet areas, light switches shall be located inside adjacent to the knob side of the door unless regulations dictate otherwise.
- 8) Emergency lighting systems shall be in accordance with European Standards, USAFE ETLs and Aviano Air Base standards. The

system shall be equipped with IMQ/CE Ni-Cd battery pack equivalent to "Everlux" type, with automatic charger for 3 hours lighting capability.

- 9) Fixtures for "EXIT" and "FIRE EXIT" signage must provide clear indication to all means of egress. Signage shall be the continuously lit type, equipped with Ni-Cd battery pack with automatic charger with an end of charge disconnection device and testing button suitable for 3 hour lighting capability. Fixture must have pictograph cover plate in accordance with European and USAFE ETL standards. Fixtures shall be "OVA Rilux CEE 8SA/3NC" or equal type.
- 10) Fixtures in high bay areas shall be high efficiency type "Disano Podoi con Endura" or approved equal.
- 11) Fixtures for external facility lighting shall be provided with photoelectric controls for manual/automatic operation, IP-54, equipped with energy saving lamps equivalent to "Disano Globo-Solar-Vega-Lord".
- 12) Fixtures for walkway lighting shall be IP-43, column type equipped with energy saving lamps equivalent to "Disano Faro".
- 13) Fixtures for external decorative effect shall be IP-657, with lamps equivalent to "Disano Koala — Dafne".
- 14) Fixtures for street and large parking areas shall be IP-55 with tempered glass diffusers, aluminum body, and high-pressure sodium lamps equivalent to "Disano Street Luminaires".

- 15) Fixtures for narrow roads and small parking areas shall be as indicated for walkways above, or as for large streets above or in combination.

14.7.0 Energy Monitoring Control System (EMCS)

14.7.1 Software and Hardware

Electrical hardware and software shall be compatible with the protocols and standards set in the electrical section of present standards, with the actual electronic equipment.

14.7.2 Connection from the Buildings to the Electric Substation

- 1) All EMCS, gas and water meter signals (impulse type meters) shall be connected by dedicated signal cable to the facility electric room as per Base standards.
- 2) A main Field Point and PXI/Compact PCI rack shall be installed to collect all facility signals (EMCS, Meters, Fire alarm, HVAC DDS, etc.) in the facility electric room. The PCI rack shall provide first step memorization, local controls and shall send required signals to the substation that electrically supply the facility.
- 3) An electronic line analyzer/meter shall be installed for each outgoing LV facility power supply line at the LV main electrical distribution panel inside all electric substations. Wherever the line analyzer/meter cannot be installed as described, an equal instrument connected as stated above shall be installed in the LV main electrical distribution panel of the facility.

- 4) The electronic meter shall be Contrel type EMA10 as installed in the Zappala area or Merlin Gerin type PM300 as installed in Z1/Z2 substations or approved equal. All installed systems shall use the same drivers.

- 5) A PXI/Compact PCI rack (to collect facility data cables and substation installed line analyzers/meter cables) shall be installed in each substation.

14.7.3 System Characteristics

The system shall be able to monitor and control all electric parameters of electric, gas, and water and send all the data by Ethernet loop to the location specified by Base Civil Engineer.

14.7.4 System Functions

The following system functions are required:

- 1) Current for each phase, instantaneous value.
- 2) Current for each phase, maximum peak.
- 3) All line voltages.
- 4) Power factor.
- 5) Instantaneous power.
- 6) Maximum power.
- 7) Frequency.
- 8) Active and reactive power value.
- 9) Alarm and fault signal.
- 10) Analogic variable trend.

- 11) Gas measurements shall include: cumulative/day, cumulative/month, and total use. If the gas pressure is not perfectly rated for the type of meter, the Contractor shall furnish a correction system to compensate for the deficiency.
- 12) Water measurements shall include: cumulative/day, cumulative/month, and total use.
- 13) Printout of all the above reports.
- 14) Measurement precision shall be a maximum of 1.5% for the active and reactive power, and a maximum of 0.5% for the values of current, voltage and other measurements.

14.7.5 System Structure

- 1) The energy monitoring and control system shall work with input/output modules (Field Point) and PXI/Compact PCI racks where it will send data on Ethernet system on TCP/IP standard.
- 2) Acquisition data modules (16 bit), and digital I/O modules to alarm managing shall be installed. All modules, feeding point, and terminal boards should be wired into dedicated industrial panel (IP65). Operation temperature shall range between -5°C to 55°C.
- 3) The electrical unit shall be capable of being removed without short-circuiting the amperometric dividers.
- 4) The EMCS shall permit local and remote monitoring capability. Remote monitoring shall be performed via Ethernet by a dedicated cable that will perform all input and output signal functions.

- 5) All EMCS equipment shall be provided with an uninterruptable power supply (UPS) unit as required.
- 6) The main server station installed in the 31CES facility in Area C shall provide daily backup for all data received from the units of the various electrical substations. A portable server shall be provided for local data management and emergency conditions. The personal computer of each single systems operator shall be used for normal, every day data management.

14.7.6 Server Station

- 1) The personal server station shall concentrate all data coming from the Field Point or acquirators located in each substation. This will control all necessary operations for data handling/management and storage (alarm, status, measurement) graphic representations, diagnostic functions, etc.
- 2) The personal server station shall have high data elaboration capability to acquire, elaborate and store data read from the control units. This shall be based on a PC platform using Windows 98/2000/XP operating system.

14.7.7 Alarm Management

The system shall display three different alarm windows:

- 1) Current alarms (received and non-received).
- 2) Non-received alarms (ongoing or disappeared).
- 3) All alarms, included system faults.

14.7.8 System Access

The system shall require a user access password and shall offer different levels of access (example: first level for reading only, second level for reading and modification, third level for reading, modification, and programming).

14.7.9 Software

- 1) The software shall be developed to allow the operator to access the building and substation data by means of an identification number, and download all energy data since the last connection period.
- 2) The software shall be “open type.” Upon completion of training, the operator may update or modify the software to increase the energy monitoring and control points.
- 3) The software shall also read all parameters in real time or with a daily, weekly or monthly trend. Software shall be in a graphical programming language that uses icons instead of lines of text to create applications.
- 4) In contrast to text-based programming languages, where instructions determine program execution, this software shall use data flow programming, where data determine execution. In this software, the user shall be able to purchase several add-on software toolsets for developing specialized applications.

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 15 – COMMUNICATIONS SYSTEMS DESIGN

15.1.0 General — Base Communications Systems

This chapter outlines the standard communications requirements for all new and renovated facilities at Aviano Air Base and its geographically separated units. All communications installations shall comply with the standards referenced in Chapter 19 — Appendix.

All internal and external cables shall be tested after installation. The results of the test and as-built diagrams shall be provided to the 31st Communications Squadron (31CS). Distribution feeder cable shall be installed from the nearest cross-connect point of the Base cable distribution system to the building's communication room. Note that existing communications lines in the project area may not be available. The A/E shall collect all available data needed for the project design at the time of the site survey. 31 CS/SCX and 31 CS/SCMPC must be consulted during the communications survey. For civil issues consult with 31CES/CECC.

All Base areas have a communications system consisting of direct burial or underground manhole/conduit system-based on copper and fiber optic cables. Specific sites shall be verified with the 31 CES/CECC in conjunction with 31 CS /SCMPC. Existing telephone cables are multi-pair, shielded, gel-filled, per U.S. specifications. Local Area Network (LAN) is provided over single mode fiber optic cable (min of 12 fibers) between network nodes and the served facility network communication rack. All interior telephone and data cables, as well as cable terminations, shall be rated for Category 5e use.

15.2.0 Underground Communications Distribution

15.2.1 Manholes and Ductbanks

- 1) Conduits from the facility communications room to the nearest communications manhole shall be at least 4-inch inside diameter (110mm OD). Runs between manholes / handholes shall not exceed 130 meters.
- 2) All conduit must be internal smooth-walled type and minimum Schedule 40 (approx. ¼") in wall thickness. Encase conduit in concrete ductbank unless otherwise directed by Base communications representative.
- 3) Design ductbank systems to no more than 75% fill rate. A target of 50% is preferred. For example, a four-duct system must have at least 1 spare conduit while a six-duct system must have at least two spares though three spares are preferable.
- 4) Manholes dimensions shall be at least 2m W x 3m L x 2.2m H. Handholes shall be at least 1.2m x 1.2m x 1.2m inside dimensions. All manholes shall have round covers, sump holes, belled-end conduits, and pulling-in irons on opposite wall of each ductbank.

15.2.2 Cable-Copper

- 1) Copper telephone cable shall be provided from the facility communications room to the base cable at the nearest manhole or splice point.
- 2) Facility cable shall be spliced to base cable counts supplied by the 31st Communications Squadron.



Communications racks

CHAPTER 15 – COMMUNICATIONS SYSTEMS DESIGN

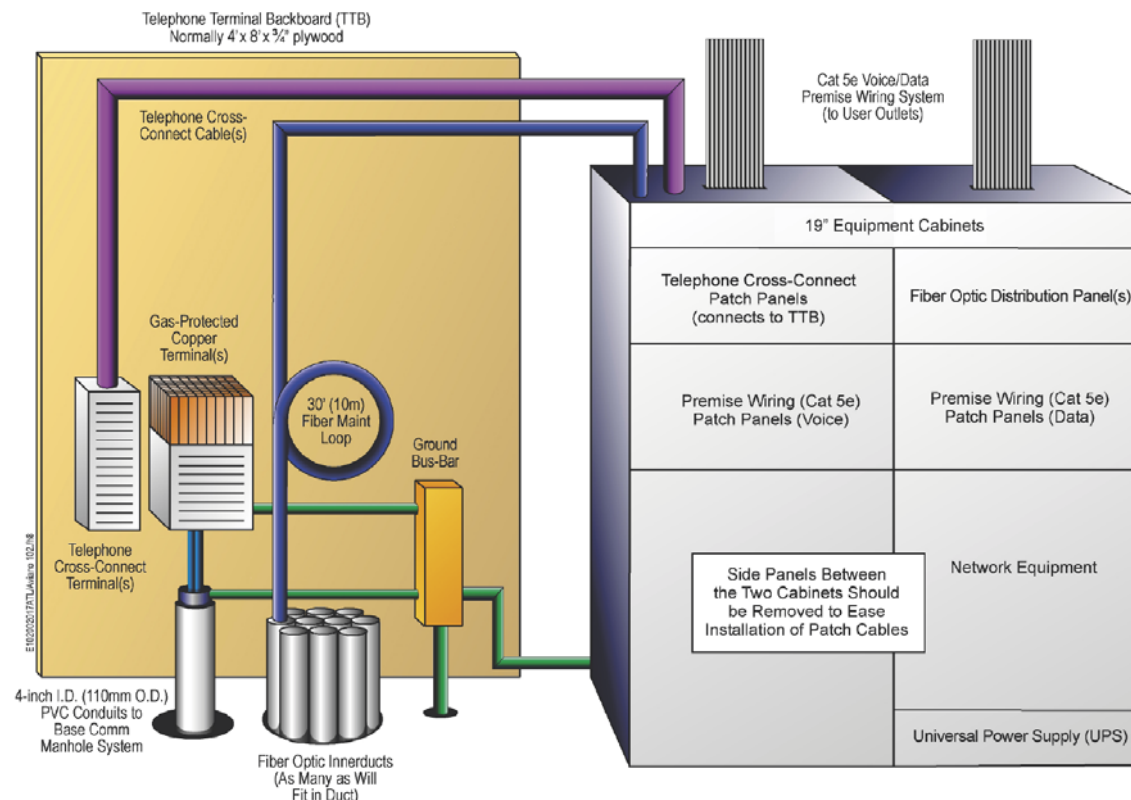
- 3) Facility cable in facility communications room shall terminate with surge-protected terminal.
- 4) All cables shall comply with Rural Utilities Service (RUS) standards 1755.390 or 1755.890 as specified by the base communications representative.
- 5) Splices shall be made with Pic-A-Bond type connectors.
- 6) Splice cases shall be stainless steel, and upon closure of splice shall be flash-tested at 10 psi. with dry ambient air or nitrogen.

15.2.3 Cable-Fiber Optical

- 1) 12-strand 8.3 micron, singlemode, Fiber Optic Cable (FOC) shall be provided from facility communications room through base manhole/conduit system to the nearest fiber sub-node.
- 2) Breakout fiber with fan-out kits and terminate with duplex SC connectors. Connect into appropriate patch panels.
- 3) All fiber runs shall be comprised of continuous, uninterrupted cable (no splices in FOC) installed in semi-rigid, smooth-walled or flexible, corrugated innerduct. Sufficient innerduct shall be installed to maximize conduit usage e.g., four 25 mm flexible, corrugated, innerducts may be placed in a 100mm conduit.
- 4) All Fiber-Optic Cables shall comply with EIA/TIA 598A standard.

15.3.0 Internal Communication Distribution & Wiring

- 1) Install an industry-standard flood-wire solution



Typical Comm Room Layout, Large Facilities or Fiber Optic Sub-Nodes/ITNs

- throughout the facility. Approximately one quad-drop every 10 square meters of office space or three linear meters of wall space.
- 2) All cables shall be at least Category-5e compliant, Unshielded Twisted Pair cable
- 3) Provide a minimum 3-inch separation between communications and electrical cables.
- 4) All outlets shall be comprised of 4 each RJ-45 connections.
- 5) A clear distinction shall be made between Voice and Data drops at both the outlets and the comm room. Voice and data lines shall be terminated on separate patch-panels in the comm room. For medium and large facilities where two racks/cabinets exist, voice and data patch panels shall be installed in separate racks/cabinets.
- 6) All cables shall be terminated in communications room or closet on 110-type patch panels mounted in 19-inch floor or wall-mounted racks, as appropriate.

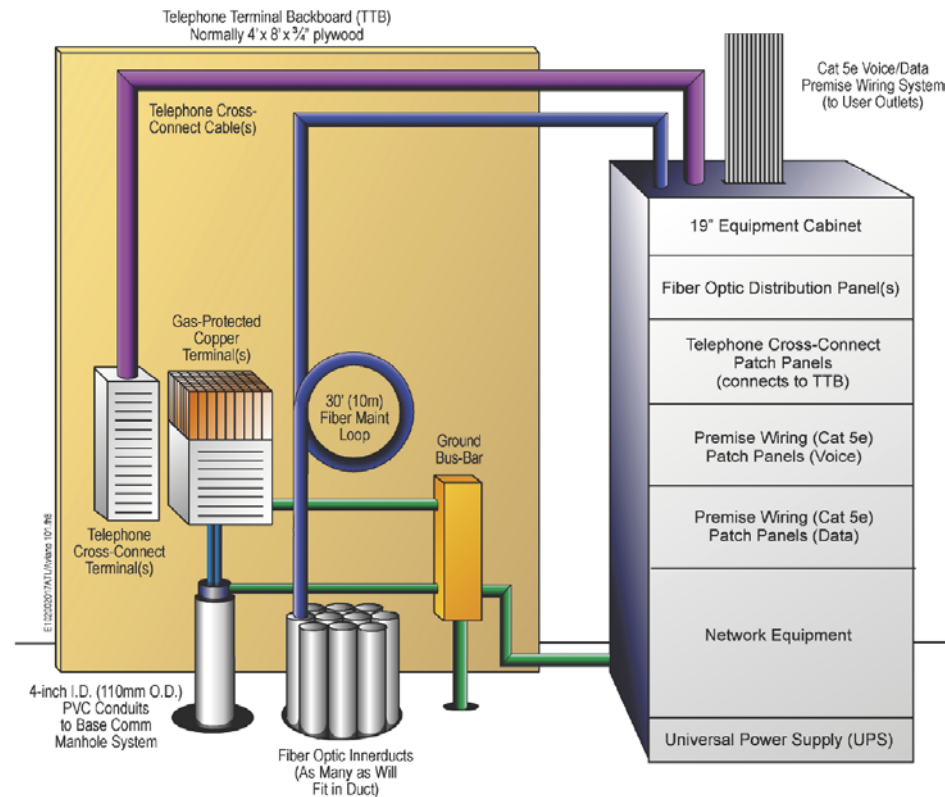
CHAPTER 15 – COMMUNICATIONS SYSTEMS DESIGN

- 7) CAT-5e terminations shall follow T568A color-coding specifications.

15.4 Communications Room

Provisions shall be made for a central communications hub point. It is far more preferable to have a separate communications room that permits maintenance that is non-intrusive to surrounding work areas. This also increases security for communications equipment. Refer to the adjacent diagrams for recommended layout of cables and equipment for both large facilities and small/medium sized facilities.

- 1) Include one main communications room per facility, with one communications closet for each additional floor. Communications room dimensions shall be at least 6' X 8' for small facilities and 12' X 16' for large facilities.
- 2) Provide one dedicated earth ground bonded at the central building ground bonding point.
- 3) In addition to normal power distribution, provide two 16A 220V power sources with outlets with dedicated circuit breakers mounted within the LAN equipment cabinet.
- 4) Dedicated climate control shall maintain 64-75 degrees F, 30-55% humidity, and positive pressure year-round.
- 5) Provide 19 inch-wide racks to terminate and patch all internal and external fiber optic cables and to install all LAN equipment. Racks shall not obstruct building entrance conduits and must be securely bolted to the floor and grounded.
- 6) Access to the Communications Room shall



Typical Comm Room Layout, Small/Medium Size Facilities

- be from within the facility only. Doors shall be lockable and swing out of the room.
- 7) Implementation of any classified communications requirements must be coordinated with the 31st Communications Squadron.
 - 8) Install two 4' x 8' x 3/4" plywood backboards near conduit entrance for termination of exterior copper cable. Paint with 2 coats of white or off-white latex paint. Locate an additional central ground here.

15.5 Community Area Television (CATV)

Facilities with a requirement for CATV shall be pre-wired. The CATV to each facility is sent via fiber-optic cable. Refer to reference documents in Chapter 19 — Appendix.

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 16 — ENVIRONMENTAL STANDARDS

16.1.0 Introduction

All designs and construction operations for the USAF in Italy must meet the requirements set forth in the most recent issue of the Department of Defense Environmental Final Governing Standards (FGS) for Italy. Refer to Chapter 19 — Appendix for reference information.

16.1.1 Contaminated / Archeological Site Excavation

- 1) Work clearance request, Form 103, shall be submitted to CEV in order to identify known contaminated sites and cultural/natural resources
- 2) Work shall be stopped immediately and CEV promptly notified if contamination or archeological artifacts are unearthed. Contact the Contracting Officer for further guidance.

16.1.2 Water Distribution Disinfection

The building water distribution system shall be tested prior to acceptance of the facility.

- 1) A bacteriological analysis is required in order to verify the adequacy of disinfection. Contact BioEnvironmental Engineering (31AMDS/SGPB) concerning testing requirements.
- 2) Refer to the FGS for additional requirements.

16.1.3 Ozone Depleting Chemicals

- 1) Class 1 ODCs shall not be used or installed.
- 2) Air conditioning unit replacements shall specify that Class 1 ODCs are prohibited. Use of R407

mix is preferred for normal air conditioning and refrigeration units.

- 3) A Material Safety Data Sheet (MSDS) shall be provided with material submittals for the type of coolant to be installed.

16.1.4 Insulation Materials

Facility insulation must contain recycled materials in accordance with the implementation of AFI 32-7080, "Pollution Prevention Program."

16.1.5 Lighting

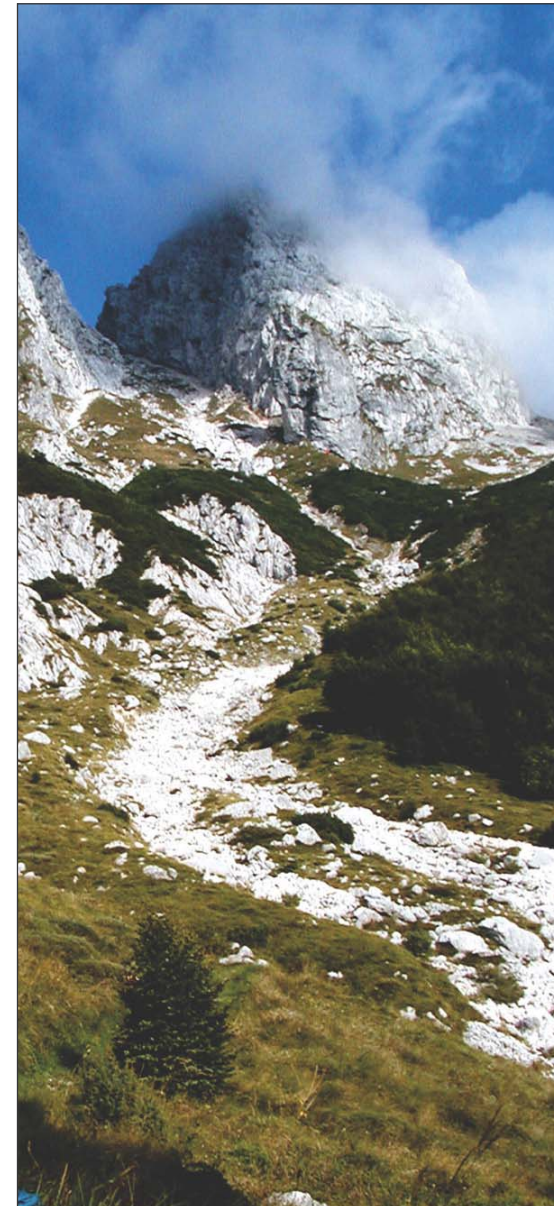
- 1) New fluorescent lamps must be energy efficient, and use electronic ballast.
- 2) Exterior lamps must have photoelectric cells or timing devices in accordance with ETL 95-4.
- 3) Mercury vapor light bulbs shall not be used; high pressure sodium or metal Halide are the preferred solution for industrial lighting.

16.1.6 Heating System Fuel

Boilers shall be gas-fired where natural gas mains are available. Where gas is not available, fuel oil shall be specified.

16.1.7 Spills

- 1) All spills of fuel or hazardous material shall be reported to the 31 CES/CECM, Base construction management, or Navy ROICC construction manager. These offices shall inform 31 CES/CEV, environmental flight immediately.



Nearby mountain landscape

- 2) The Base fire department shall be contacted immediately in cases where the contractor cannot contain the spill.

16.2.0 Sound Attenuation

Sound attenuation may be required for facilities depending on the location. Aircraft noise in Area F (the Flightline) and Area E (16th AF) shall be addressed in facility design. Most facility sitings north and south of the runway are outside of the 85 dBA AICUZ contour, but within the 75 dBA contour. Peak levels in some areas are in excess of 130 dBA. Sound pressure levels above 65 dBA are unsatisfactory for office environments. Levels above 65 dBA make telephone use and oral communication difficult.

- 1) Design for facilities in all areas must consider noise not only from aircraft but also from sources such as mechanical systems and industrial operations.
- 2) Verify sound levels from AICUZ contours available from CECP or CEV.
- 3) Buildings shall be designed with a minimum STC of 45.
- 4) Building materials and methods as well as orientation of doors and windows shall be considered to attenuate noise levels.
- 5) The overall sound pressure levels from aircraft operations shall not exceed 70 dBA for flightline industrial work centers.
- 6) Administrative areas may be located in the center of buildings to achieve adequate reduction of peak sound pressure levels.

Generators shall be isolated to reduce ambient sound pressure levels to below 80 decibels, A-weighted (dBA).

16.3.0 Radon Mitigation

Aviano Air Base is located in an area that has high levels of radon gas naturally occurring in the soil. The Base Bio-Environmental Flight has recorded up to 80 pCi/L in existing facilities. While EPA Radon mitigation action level is 4 pCi/L, the radon system design shall permit less than 2.7 pCi/L as per EU recommendation. Radon levels for current buildings are available from Bio-Environmental Engineering, 31 AMDS/SGPB.

- 1) New construction and major renovations shall comply with radon mitigation exposure criteria not to exceed 4 pCi/L for the entire facility. However, radon mitigation requirements do not apply to the following types of spaces: hangers, maintenance bays, alert shelters, spaces used strictly for storage (including mechanical, utilities, electrical, communication rooms, toilet rooms), or any room or building that is not occupied more than 4 hours per day by one individual as stated in the radon mitigation document.
- 2) Radon mitigation shall be achieved by natural ventilation of the sub-slab 20cm high cavity required by regional and municipal law. The chosen design shall meet the aforementioned exposure criteria.

16.4.0 Drainage Systems

Discharge of contaminants into or above the ground is prohibited. All wastewater shall be discharged into the proper treatment channels as directed by FGS Italy.

16.4.1 Sanitary Sewer

Areas A1, A2, C and Zappala are the only areas with sanitary sewer system at this time. Construction of mains for the Flightline area are underway and completion is scheduled for spring of 2003. The A/E shall verify the location of sanitary sewers near the project site.

- 1) A septic tank shall be where no sanitary sewer is available. The tank shall be an IMHOF type constructed in accordance with the local Italian sanitary regulations.
- 2) The A/E shall provide a design with an additional manhole with connections for a future sewer system.
- 3) Lavatories shall be equipped with flow limiting devices meeting requirements of ETL 95-4.
- 4) Backflow prevention devices shall be included where necessary.
- 5) Storm water and sanitary sewer lines must be kept separate; sanitary sewer must be connected to main sewer. Storm water shall be conducted as appropriate either underground or above ground in accordance with applicable norms.

CHAPTER 16 — ENVIRONMENTAL STANDARDS

- 6) No underground or surface wastewater discharge (e.g., from septic tanks or storm drainage from paved areas) shall be located within a 200 m radius of drinking water supply wells.
- 7) Clean storm water from roof gutters or similar sources shall be segregated from potentially contaminated run-off (from sources such as parking lots) and discharged directly into the ground.

16.4.2 Parking Lots

- 1) Discharge from large parking lots shall pass through a baffled coalescent oil/water separator before discharge into a drywell. The separator shall be equipped with a pre-decantation chamber and post mitigation sampling manhole.
- 2) The separator shall be sized to accommodate the total surface area to be drained. The specified oil/water separator shall be technologically state-of-the-art and capable of ensuring the highest abatement efficiencies currently available (Total Petroleum Hydrocarbon ≤ 5 mg/l).
- 3) Every newly-installed oil/water separator must be provided with adequate as-built drawings and operation and maintenance manuals.

16.4.3 Vehicle Washing Facilities

- 1) Vehicle washracks or other outside cleaning processes utilizing water shall have closed-loop systems with floor drains to collect wastewater. The collected wastewater shall be treated and recycled — ground discharge is prohibited. Floor drains are not permitted — refer to

following paragraph.

- 2) The closed-loop system shall be protected from the introduction of external storm water by means of berms and a roof.

16.4.4 Floor Drains

Since the Base is not supported by an industrial wastewater sewer system, all industrial spills shall be treated as hazardous waste spills. It is prohibited to discharge industrial wastewater into the Base sanitary sewer system. It is Base CEV policy to mitigate illegal discharge of industrial waste by eliminating floor drains in industrial areas. Where production of wastewater from industrial activity is expected, both new construction as well as renovation projects shall meet the following requirements:

- 1) Floor drains shall be prohibited in rooms, bays, canopies, or any other areas subject to industrial activity. Utility rooms (i.e. boiler, mechanical, and equipment rooms) shall be included in this category.
- 2) Where a floor drain is essential for operations, the drain shall be connected to a pre-packaged treatment/filter unit suited for the application. The contaminated water shall then be discharged to an aboveground collection tank for contract removal/treatment. The holding tank shall have a capacity that exceeds that of the drain by 20%.



Aviano's municipal waste treatment plant

CHAPTER 16 – ENVIRONMENTAL STANDARDS

- 3) Floor drains are permitted in rooms where normal “domestic” activities take place, i.e. bathrooms, lockers rooms, kitchens, offices. These drains shall be connected to a sewer line, or where not available, to a septic tank.

16.5.0 Solid Waste Materials

The construction contractor shall dispose of all solid waste at off-base disposal facilities in accordance with Italian laws. Base trash containers shall not be used. A solid waste management plan shall be provided if large quantities of solid waste will be generated.

16.6.0 Hazardous Materials / Waste

16.6.1 Construction Waste

- 1) The contractor shall identify all hazardous materials required for completion of the project.
- 2) The contractor shall furnish English language versions of the Material Safety Data Sheets (MSDS) of hazardous materials to CEV for approval and coordination through SEG and SGPB.
- 3) A hazardous waste management plan shall be provided by the contractor if a large quantity of hazardous waste is expected to be generated.
- 4) The contractor shall ensure that hazardous materials utilized during construction do not contain any chemicals listed as EPA 17 toxins. A list of the EPA 17 toxins can be obtained from the 31 CES/CEV office.

16.6.2 Industrial Waste

Industrial facilities that will generate Hazardous Waste (HW) during operations shall have an integral HW storage area that is secured and provides adequate secondary containment for liquid HW.

16.6.3 Asbestos

A Base-wide asbestos survey was conducted in 1996 and subsequently updated. Results of this survey are available in the CE Graphical Information System (GIS) or the CE office.

- 1) The contractor shall provide for the proper removal and disposal of asbestos material if the material is to be disturbed by construction activity. The contractor shall comply with Italian regulations and notify local health authorities (ASL) prior to beginning work.
- 2) If material suspected to be asbestos is found and was not previously tested, work must be discontinued until the material is properly identified.

16.6.4 Paints

Only non-lead based paints with a low level of volatile organic compounds (VOC) shall be specified.



Former construction/demolition debris landfill in Area F

CHAPTER 16 — ENVIRONMENTAL STANDARDS

16.6.5 Petroleum, Oils & Lubricants Storage

As the conversion of Aviano AB to natural gas is in progress, heating oil tanks may be unnecessary for future year projects. Check with CECP for further information.

- 1) All storage tanks for Petroleum Oil and Lubricants (POL) products shall be double-walled and situated above ground (ASTs), unless approved by the 31 CES/CC.
- 2) Tanks shall include vacuum or nitrogen pressurized type, automatic leak detection systems with local and telealarms, spill and overfill prevention equipment and shall be protected against corrosion.
- 3) Fuel lines shall be installed aboveground. If this is not possible, the fuel lines shall be contained in concrete trenches just below grade and covered with grates to allow easy inspection for possible leaks.
- 4) Fuel oil fill points shall be lockable and have a warning bell to notify personnel when the tank is full.
- 5) A fuel gauge is required to indicate tank level.
- 6) A fuel storage and day tank shall be provided complete with manual and automatic fuel transfer pumps.
- 7) All storage tanks must meet specifications of the HQ USAFE Storage Tank Policy, dated, August 1994. Tanks in vaults will be considered ASTs.

References

Refer to Chapter 13 — Mechanical Design for radon mitigation design details.

Refer to Chapter 12 — Structural Design for additional radon mitigation standards.

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 17 – GENERAL PROVISIONS FOR CONSTRUCTION

17.1.0 Contractor General Requirements

The construction contractor shall perform all work to prepare and furnish to the USAF a complete construction package in accordance with all the requirements as specified hereinafter.

- 1) Contractor access route shall be shown on the 95 percent contract documents.
- 2) Contractor storage area shall be shown on the 95 percent contract documents.
- 3) Contractor shall install a solid fence around the construction site, particularly in high-visibility areas.
- 4) Security of material and equipment shall be afforded by a secure fenced area, erected and maintained by the contractor for the duration of the contract. Contractor is responsible for pilferable materials and equipment.

17.1.1 Ground Safety

- 1) The contractor shall ensure that designs comply with all required OSHA, AFOSH and Italian safety laws as identified in the Chapter 19 — Appendix. The most stringent of the referenced norms shall apply for every applicable issue.
- 2) Regulations are available in 31 CES/CECP and 31 FW/SE.

17.2.0 Existing Site Conditions

- 1) The A/E shall coordinate the contractor laydown areas with the Base Planner early in the design

process. These areas shall be indicated on all project drawings.

- 2) The contractor shall verify actual field conditions, record these conditions in the drawings and locate obstructions that may have an impact on the design or construction of the project.
- 3) The contractor shall allow the USAF PM a minimum of 48 hours to deliver any available reference drawings that are requested. The USAF does not guarantee the accuracy of the reference drawings.
- 4) The contractor shall make a complete survey of the project site and shall record elevations, location of all utilities above and below ground including their size and elevation, width of adjacent streets, pavements, ditches, and locations of other obstructions such as catch basins, manholes, utility poles, and fire hydrants.
- 5) All water feeders and secondary distribution lines serving existing facilities that are disturbed during excavation shall be reconnected as quickly as possible.
- 6) If on-site soil borings are required, care shall be taken not to disturb surrounding turf, planting beds, or pavements. Holes shall be refilled within five working days and the area and its surroundings returned to its original condition.
- 7) Trees adjacent to project site shall be fully protected from damage by construction equipment. All trees and shrubs affected by the work shall be replanted.



Secure site entrance signage

CHAPTER 17 — GENERAL PROVISIONS FOR CONSTRUCTION

- 8) All grass areas and berms shall be graded, cleaned of stones and foreign objects, fertilized and re-seeded. Watering of seeded areas shall be required during summertime.
- 9) Clean topsoil shall be carefully excavated and stored on Base for reutilization.

17.3.0 Site Restrictions

- 1) Works shall be performed only within the confines of Aviano Air Base.
- 2) All personnel shall comply with applicable security norms and other internal security measures.
- 3) Contractors shall be granted access only to those areas required in order to perform the work as well as to Area C — the Base Civil Engineer compound. Contractor shall not have free access to restricted and controlled areas.
- 4) Access to all other areas shall require the authorization of 31st Security Forces Squadron (31 SFS). Military escorts shall be provided by Base agencies. Personnel working in restricted areas may be subject to search by military security personnel.
- 5) Authorized entry into restricted or controlled areas normally requires approximately 24 hours.
- 6) Since the construction site is within a military area, the contractor must comply with Italian laws that protect military secrecy. Photography on Base is not permitted unless authorization is granted by SFS. The obligation is extended also to subcontractors and anyone who is involved in the execution of the work.
- 7) Military operations may cause unplanned temporary work stoppages. All employed personnel as well as suppliers may be subjected to further controls. The Director of Works and 31 CES/CEC shall give the contractor advance notice of potential interruptions whenever possible.
- 8) Work to be performed in the vicinity of airfield pavements (runway, taxiways, aprons, etc.) as well as in restricted areas, are subject to interruption (hours) due to aircraft takeoffs, landing or taxiing, and stoppage (days) due to Base exercises.
- 9) The contractor shall provide fencing that encompasses the project area. The extent of the project area shall be determined by the Director of Works in coordination with the 31CES/CEC representative. Bilingual signs (“VIETATO L'INGRESSO — LAVORI IN CORSO / WORK AREA — NO ENTRY”) shall be installed at each work area entry gate. At work completion, the temporary fence shall be removed and the area shall be restored to its original condition.
- 10) Obstruction lights shall be used where necessary from sunset to dawn.
- 11) Loading and unloading material shall be performed within the fenced area. Contractor's personnel, vehicles and equipment must not obstruct the access roads to other facilities.
- 12) Contractor shall establish clear sight triangles at construction job site entrances/exits.
- 13) Temporary parking of vehicles may be authorized for loading and unloading materials in the proximity of the work area. Parked vehicles shall not obstruct traffic.
- 14) The work area shall be kept clean and accessible for the inspectors and for emergency vehicles and personnel. Protected passages shall be provided where the activities will not be suspended.
- 15) Restricted areas shall be fenced with 3.8 mm., 2.14 m. high galvanized steel fences anchored to a 0.2 x 0.4 m. built in place concrete curb.
- 16) Permanent fences shall be provided around designated open storage areas.
- 17) Temporary bridges adequate for heavy traffic shall be provided at all road cuttings.
- 18) Circulation outside the project jobsite enclosure will be not allowed, with the exception of the route connecting the construction site gate to the Base main gate.

17.4.0 Site Utilities

17.4.1 Sanitary Sewer

- 1) Where there is no Base sanitary sewer system all sewer effluents generated during the construction phase shall be collected and disposed by the contractor at his expense.

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- 2) The utilization of the existing “Imhof” tanks can be authorized by the 31CES/CEC only in particular cases and with prior approval.
- 3) The contractor shall provide, within the job site perimeter, an adequate portable toilet facility connected to an independent wastewater collection system. In some cases, the utilization of existing facilities may be considered and authorized by the 31CES/CEC official representative.

17.4.2 Water Distribution

- 1) Wherever possible, the contractor is authorized to connect the construction site water line to the existing Base water distribution system as per 31CES/CEC instructions. However, the contractor is responsible for providing all the connection works as well as the restoration of the lines upon completion of the work.
- 2) Testing shall be performed to ensure that required protective coatings and cathodic protection systems have been provided in accordance with the project specifications. Three copies each of area maps shall be furnished to the 31 CES/CEO Corrosion Control Engineer showing installation of cathodic protection systems, tabulated testing results, a list of equipment and materials, maintenance and operation manuals, and maintenance equipment.
- 3) The 31 AMDS/SGPB shall verify that adequate disinfection and backflow prevention devices have been provided for service line connections prior to approval.

17.4.3 Electrical Service

- 1) Wherever possible, the Contractor is authorized to connect the job site equipment panel to the existing electrical distribution system as per 31CES/CEC instructions and Italian IAW and US electrical safety norms.
- 2) Connection to the electrical supply shall be granted for electrical powered equipment that does not exceed the capacity of the existing distribution lines or that does not require special voltage. In all other cases it is the responsibility of the contractor to provide for the necessary electrical source by means of generators, etc.
- 3) Job site electrical panels shall conform to applicable European codes. The contractor shall not modify or improperly use approved panels.

17.4.4 Utility Outages

- 1) Utility outages on electrical substations shall be limited to 4 (four) hours.
- 2) Utility outages shall occur during non-standard work hours (1700 to 0800) and require approval of the 31 CES/CEC two weeks prior to the outage.
- 3) The contractor shall provide a temporary power supply whenever the outage is expected to exceed the four-hour limit.
- 4) The contractor shall provide temporary substations for extensive periods of outage.
- 5) AF Form 979 shall be used as the authorized tagout device. Lockout and tagout devices shall be standardized according to either color,



Zappala - temporary lodging facility under construction



Zappala Area - Visiting quarters under construction



Area A2 - Water distribution facility under construction

CHAPTER 17 — GENERAL PROVISIONS FOR CONSTRUCTION

shape, or size. Tagout devices shall also be standardized according to font and format.

- 6) Tags shall be legible and comprehensible by all employees. Tags and their means of attachment shall be made of materials that will withstand the environmental conditions encountered in the workplace, particularly when used in corrosive or wet environments, and shall be securely attached to the energy isolating devices so that they cannot be detached during use.

17.4.5 Fire Protection Systems

- 1) The contractor shall notify the Base Fire Chief whenever an existing fire detection alarm or extinguishing system must be disconnected, relocated, and/or extended.
- 2) Fire protection system components shall be handled carefully, and tested/certified by 31 CES/CEF to insure reliability when the system is restored to service.

17.5.0 Construction Debris Disposal

Site cleanliness, particularly at the site perimeter, is of special interest to this Base. The following requirements shall be followed:

- 1) Site cleanliness shall be adhered to at all times.
- 2) The contractor shall remove waste material from the job site on a daily basis.
- 3) The contractor shall be responsible for work site debris collection by means of a special dumpster and dispose of debris according to the Italian

norms and the characteristics of the debris.

- 4) The use of urban solid trash containers within the military area is allowed only in certain cases and after previous authorization by 31CES/CEC.
- 5) The contractor shall also dispose of demolition and excavation work debris at the closest authorized dump (specifically outside the Aviano territory) according to type of material as specified by Italian norms. Waste shall consist mainly of construction material scrap and waste and excavation materials including gravel, sand, clay, and rocks.
- 6) The contractor shall be responsible for the removal of reclaimable materials, previously identified by 31CES/CEC. Such materials shall be accurately handled and protected, and temporarily stored on work site prior to their transportation to locations indicated by 31CES/CEC. The contractor shall also supply containers for such material reclamation.
- 7) The contractor shall provide for proper disposal of asbestos or any other type of toxic or harmful material known to be onsite or inadvertently encountered during demolition works and previously identified. Removal shall be in accordance with Italian law.

17.6.0 Master Keying

- 1) Access to the existing and new facilities shall be provided with an existing master key system provided by "Best Lock Corporation" at P.O. Box 50444, Indianapolis, Indiana 46250.

- 2) All new locks shall be keyed into a uniform master-keyed locking system as manufactured and supplied only by Best Lock Corporation.
- 3) All locks shall be ordered by contractor under "A" KEYWAY, MASTER KEY M1, SUBMASTER 1, already selected by 31 CES/CEO Aviano Air Base, Italy.
- 4) Orders or requests shall not be placed or issued by the Contractor without the written approval of CES/CEO since master-keyed locks, cores, and keys cannot be released to unauthorized personnel.

17.7.0 Color Board Submittals

- 1) Color boards shall be prepared for all large projects.
- 2) The contractor shall, in accordance with the best professional practice, prepare a comprehensive color board(s) for all architectural finishes when user-defined finishes do not match exterior or interior standard finishes.
- 3) Interior and exterior color selections, material types and patterns shall be indicated on a sample color board. The color board shall include:
 - a. Paint Chips
 - b. Carpet Samples
 - c. Tiles (Floor, Walls, and Ceiling)
 - d. Vinyl Wall Covering
 - e. Exterior Finish System
 - f. Cladding

CHAPTER 17 — GENERAL PROVISIONS FOR CONSTRUCTION

- g. Door Hardware
 - h. Other significant materials as required
- 4) The color boards shall be A3 size and submitted for Base review and approval by 31 CES/CEC during the 65 percent review. The contractor shall submit the color board a minimum of four weeks prior to the 95 percent submittal in cases where a 65 percent submittal is not required. This will allow sufficient time to review the proposal and revise the color boards prior to the 95 percent design stage.

17.8.0 Authorizations

- 1) It will be 31CES/CEC responsibility to obtain all the necessary Base permits and authorizations for contractors.
- 2) The Italian Air Force shall provide all the authorizations required by Italian laws and construction norms.
- 3) Entrance in restricted areas shall be requested 72 hours in advance and coordinated with Base security police thirty minutes prior to entry time.
- 4) The A/E and project managers shall coordinate any required Temporary Airfield Criteria Waivers with CE Base Planner, Ops Group, and Wing Safety office. The A/E shall also determine the maximum height and location of the construction crane in accordance with all airfield criteria.
- 5) All new construction, facility change of use, or modification/renovation of facilities in Area F will be coordinated with the 31 FW Weapons Safety Office prior to the expenditure of

resources to ensure compliance with quantity-distance criteria.

17.8.1 Non-Standard Workdays

Work on Base shall not be performed during US or Italian holidays (including other Base closure days) and after or before the regular working hours (Monday through Friday, from 0800 to 1700 hours, of each week) unless otherwise approved by the Director of Works in cooperation with 31CES/CEC. Any variation on the above schedule must be requested at least 5 days in advance of the proposed work schedule and be authorized by the Director of Works and 31CES/CEC.

17.8.2 Construction Season Limitations

Appropriate weather conditions during the performance of project works shall be in accordance with approved construction practices as determined by 31 CES or the Director of Works. In any case, work shall not be performed without previous authorization from the 31 CES or the Director of Works.

17.8.3 Digging Permits

Excavation shall be permitted only after the proposed work has been coordinated with the Director of Works and has received the approval of 31 CES/CEC.

17.8.4 Flammable and Toxic Substance Storage

Any liquid, flammable, or any other toxic substances that are required for the execution of the works, shall be kept in properly labeled, special containers. Relative data (quantity, characteristics and location) shall be transmitted to 31 CES/CEF or 31 CES/CEV

through the Director of Works.

17.8.5 Open Flame Operations

Open flame, electric welding, and onsite burning of material shall be strictly prohibited except when it is necessary for the proper execution of the works and it has been authorized. All requests for authorization shall be directed to the Base Fire Department (31 CES/CEF) through the Director of Works.

17.9.0 Tests and Certifications

- 1) Prior to facility acceptance, the contractor shall provide 2 copies each in English and Italian language of all the testing results and certifications.
- 2) Certifications shall be in accordance with all applicable Italian laws, norms, and local regulations for the acceptance, use, and setting in operations of all systems and/or structures.

17.9.1 Water Supply Analysis

- 1) The building water supply shall be tested prior to acceptance of the facility to ensure water lines are adequately flushed of debris, disinfected, and free of leaks and infiltration.
- 2) At a minimum, sample results shall be provided for chlorine, pH, e-coli, total suspended solids, total dissolved solids, leads, and copper.

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

CHAPTER 18 – CADD/GIS DRAWING STANDARDS

18.1.0 Contract Drawings

- 1) All contract drawings shall be provided in digital format.
- 2) AutoCAD 2002 is the Air Force standard for Computer Aided Design Drafting (CADD). The only acceptable drawing extensions shall be DWG, DXF, or DGN. All CADD submittals shall include a full-scale plan, appropriate plotting scale factors for each drawing sheet, and a list of all reference files. The A/E shall also supply a text document containing the CADD standards used including: level (layer) names, font style, line styles, color usage, etc.
- 3) The preferred CADD standards are the Tri-service A/E/C standard. All Geographical Information System (GIS) products shall be provided in accordance with the Tri-Service Spatial Data standards. A copy of these standards may be down loaded from the Tri-Service's home page (<http://mr2.wes.army.mil>) or a disk copy can be provided upon request.
- 4) All CADD products shall use standard text fonts and menu applications. If any custom linestyles, fonts or menu is used in the production they must be included in all submittals.

18.2.0 Drawings

All contract drawings to be furnished shall be well prepared, complete, and accomplished in accordance with the best professional practice to show clearly and concisely the type and extent of work to be performed. The drawings shall be drawn to appropriate scales and dimensioned completely and accurately. Floor plans

shall be consolidated and appropriately scaled to fit on one sheet only. Each page shall be maximized (avoid blank sheets) and appropriately laid out to present a concise, logical sequence.

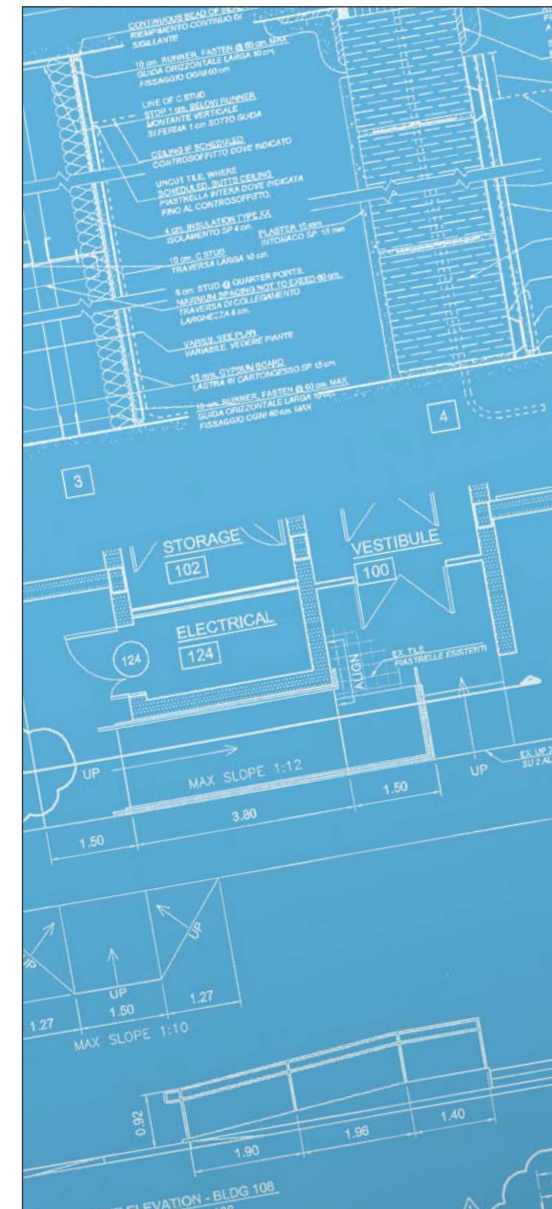
All new exterior construction projects shall include accurate location coordinates (latitude and longitude) on the provided site plans. The acceptable procedures for providing coordinates are by referencing the provided benchmarks or providing GPS readouts.

Drawing sizes shall be submitted on A1 (841mm x 594mm) paper size for construction projects and A0 (840mm x 1188mm) for all mapping projects.

18.3.0 Drawing Cover Sheet and Title Block

All drawing submittals shall have a cover sheet illustrating the following:

- 1) Base Map:
 - a) Indicate construction site.
 - b) Indicate contractors access route.
 - c) Project number / title.
- 2) Base review signature block, including:
 - a) Using Agency
 - b) Communication
 - c) Security Police
 - d) Bio-Environmental
 - e) Fire Protection
 - f) Safety



Computer Aided Design drawing

- g) Base Civil
 - h) Engineering Flight Chief
 - i) Environmental Flight Chief
- 3) Title Block: All drawings within the submittal shall have identical title blocks located at the bottom right hand corner. A copy of the preferred title sheet and title can be provided in both digital and hard copy upon request.

18.4.0 Drawing Format and Document Sequence

The lead consultant shall submit the entire package in the following format and sequence.

- 1) Preliminary sketch plan (PSP) —15 percent. Five copies of a fully bound package using the A3 (420mm x 297mm) sheet size and containing:
- a) Appropriate drawings.
 - b) Building and civil engineering design analysis report.
 - c) Mechanical and electrical design analysis report.
 - d) Combined budget cost plan.
 - e) Separate cost for new construction.
 - f) Separate cost for repair and maintenance of existing.
 - g) Separate cost for demolition, if applicable.
 - h) Program schedule.

- 2) Final sketch plan (FSP) — 35 Percent. Five copies of a fully bound package using the A3 sheet sizes and containing the same inclusions as the (PSP).
- 3) Working drawings — 95 Percent: Five copies of a full contract package using A4 sheet sizes for specifications and A1 sheet sizes for all drawings. The package shall be in the same format as the (PSP) and (FSP). One color board as required shall be submitted as identified in section 3.05.
- 4) Construction working drawings — 100 Percent: One (1) copy of a fully bound package using the same format as the PSP — FSP and working drawings above.

18.4.1 Additional Submittals

The consultant shall submit the following additional items:

- 1) One (1) copy of reproducible mylar construction working drawings using the A1 (841mm x 594mm) sheet sizes.
- 2) One (1) copy of specifications using the A4 (297mm x 210mm) sheet sizes, fully bound.
- 3) One (1) color board using A1 sheet size, as required.
- 4) A complete set of digital 100% drawings will be submitted for all projects. The digitized drawings shall be compatible with AutoCad 2002 or shall include all necessary codes to allow the USAF to modify drawings as deemed necessary.
- 5) Submittals shall be provided on CD ROM or 3½" diskette.

NOTE: The Preliminary sketch plan (PSP) — 15 percent design stage may not always be a requirement but shall be programmed for unless deleted during the pre-design meeting (PDM). Conversely, an additional 65 percent design submittal may be required but shall not be programmed for unless directed to do so at the (PDM).

18.5.0 Geographical Information System (GIS)

All data collected shall be provided in accordance with the Tri-Service Spatial Data standards. Data not identified by the Tri-Service standard should be immediately brought to the attention to the GIS manager for further guidance.

- 1) The graphical and tabular GIS data shall be provided in ESRI Shapefile format.
- 3) Front end templates for viewing queries shall be developed and provided in ARC VIEW.

References

Refer to Chapter 19 — Appendix for applicable references, codes, and regulations.

19.1.0 References

This section contains a list of recommended references specific to each sector of design specialization. Contractors shall refer to, but not limit their references to, the most recent edition of the listed publications.

19.1.1 Chapter 3 – Comprehensive Planning

- 1) AFI 32-7062, Air Force Comprehensive Planning, 1 October 1997
- 2) AFI 32-1010, Land Use Planning, 1 November 1998
- 3) The general Plan Guide and Template, HQ Air Force Center for Environmental Excellence (AFCEE)
- 4) Master Statement of Work, Air Force Comprehensive Planning, 9 April 1999
- 5) The Image of the City, Kevin Lynch, 1960

19.1.2 Chapter 4 — Security Design

- 1) Air Force Regulation 127-100 Explosives Safety Standard
- 2) Air Force Regulation 161-35 Hazardous Noise Exposure
- 3) Air Force Handbook 32-1084 Facility Requirements Handbook
- 4) MIL-HDBK 1013/1A Physical Security Designs
- 5) Air Force Instruction (AFI) 21-210 Air Force AT/FP Program Standards.

- 6) AFI 31-209 Air Force Resource Protection Program (Chapters 3, 4, 5)
- 7) AFI 31-210 Air Force Antiterrorism Program
- 8) AFMAN 32-1071
VOL I Security Engineering Project Development
VOL II Security Engineering Concept Design
VOL III Security Engineering Final Design
- 9) Department of Defense (DoD) Directive 2000-12, DoD Combatting Terrorism Program.
- 10) DoD Instruction 2000-16, DoD Combatting Terrorism Program Standards.
- 11) DoD Antiterrorism/Force Protection (AT/FP) Construction Standards.
- 12) USEUCOM Operations Order (OPORD) 01-01 Force Protection Design Standards.
- 13) UFC (Unified Facilities Criteria) 4-010-01 Minimum Antiterrorism Standards for Buildings.

19.1.3 Chapter 5 — Site Design

- 1) UFAS, Uniform Federal Accessibility Standards
- 2) ADAAG, Americans with Disabilities Act Architectural Guidelines
- 3) Privately Owned Vehicle (POV) Parking lots:
AFM 86-2 standards

19.1.4 Chapter 7 — Signage

Sign identification, direction, regulation, morale, and information signs, street address signs, base destination signs, parking regulation signs, and interior signs:

- 1) Air Force Pamphlet 32-1097, 1 November 97

Construction signs

- 2) Engineering Technical Letter (ETL) 93-1, Construction Signs, 11 March 93

AAFES Facilities

- 3) AAFES Graphics Standards Manual

Safety Signs

- 4) AFOSH 9166, General Industrial Operations (updated by the Air Force safety Center)

Legal requirements for Air Force installation warning signs, controlled area signs, and restricted area signs

- 5) AFI 31-209, usaf resources Protection Program and AFI 31-101, Volume I, The Air Force Physical Security program

Sign design and placement

- 6) Americans with Disabilities Act (ADA)
- 7) Manual on Uniform Traffic Control Devices (MUTCD by Federal Highway Administration)

Installation Inventory

- 8) AFR75-88 Highways for National Defense, Development and Maintenance of Traffic Control Device Inventories for DoD Installations.

CHAPTER 19 — APPENDIX

Air Force Standards

- 9) AFI 31-209 USAF Resources Protection Program
- 10) AFI 31-101, Volume I, Air Force Physical Security Program
- 11) AFOSH 9166, General Industrial Operations
- 12) AFPM 32-1097, Sign Standards Pamphlet, 1 November 1997
- 13) AFR 75-88, Highways for National Defense
- 14) ETL 93-1, Construction Signs, 11 March 1993
- 15) Development and Maintenance of Traffic Control Device Inventories for DOD Installations

United States Standards

- 16) MUTCD, Manual on Uniform Traffic Control Devices
- 17) ADA, Americans with Disabilities Act

General Standards

- 18) AAFES Graphics Standards Manual

Website-Recommended

- 19) <http://afpubs.hq.af.mil/pubfiles/af/32/afpam32-1097/afpam32-1097.pdf>

19.1.5 Chapter 8 — Architectural Design

Handicapped Access

- 1) Americans with Disabilities Act Accessibility Guidelines (ADAAG)
- 2) Uniform Federal Accessibility Standards (UFAS)

Administrative Spaces:

- 3) AFH 32-1084, Facility Requirements Handbook, Sep 96, Chapter 12, Category Group 61 — “Administrative Facilities”

Confined Spaces

- 4) Title 29, Code of Federal Regulations, Part 1910.146, Confined Spaces
(available from the 31 MDOS/SGOAB)

Hardware

- 1) UFAS United Federal Accessibility Standards
- 2) ADAAG Americans with Disabilities Act Architectural Guidelines
- 3) ETL 97-22
- 4) Law 10/91 for Energy Conservation

19.1.6 Chapter 9 — Interior Design

Glazing

- 5) AFMAN 32-1071, Vol. 1 force protection requirements for glazing.

Carpet and Carpet Systems

- 6) ETL 94-3, Air Force Carpet Standards
- 7) HQ AFCEE Carpet Selection Handbook.
- 8) FFA — Federal Flammability Agency: FF1-70 (Pill Test) — Office of the Secretary, Consumer
- 9) Product Safety Commission, Washington D.C. 20207

- 10) ASTM — American Society for Testing and Materials — E648 — Naval Publications and Forms Center, 5801 Tabor Ave, Philadelphia, PA 19120

19.1.7 Chapter 10 — Fire Protection

U.S. Codes

- 1) MIL-HDBK-1008B Fire Protection for Facilities, Engineering, Design, and Construction
- 2) All NFPA National Fire Protection Association Codes
- 3) NFPA 13 Sprinkler Systems
- 4) NFPA 17A Standard for Wet Chemical Extinguishing Systems
- 5) NFPA 70 National Electrical Code
- 6) NFPA 72 Standard for Fire Protection Signaling Systems
- 7) NFPA 72E Automatic Fire Detectors
- 8) NFPA 80 Fire Doors and Windows
- 9) NFPA 96 Standard for Installation of Equipment for the Removal of Smoke and Grease Laden Vapors
- 10) NFPA 101 The Life Safety Code
- 11) NFPA 403 Standard for Aircraft Rescue and Fire Fighting Services at Airports
- 12) NFPA 1500 Standard for Fire Department Occupational Safety and Health Program
- 13) NFPA 409 Aircraft Hangars
- 14) NFPA 410 Aircraft Maintenance

- 15) Air Force Regulation 91-38
- 16) AFH 32-1084 Facility Requirements Handbook
- 17) ETL's 86-8, 86-9, 90-6, 90-9, 91-1, 91-4, 91-5, 93-4, 96-1, 99-12, 00-7 and 01-2
- 18) ETL 00-7: Fire protection Engineering Criteria — Correlation of US and Host Nation Codes and criteria.

Italian Codes

- 1) Ministerial Decree, 10 March 1998, General requirements for fire protection safety and the control of emergencies in work places.
- 2) Ministerial Decree, 4 May 1998, Regulations for the compilation and presentation of fire prevention documents as well as the related services delivered by the Provincial Fire Department Comand (Comandi Provinciali dei Vigili del Fuoco).
- 3) UNI 9795, March 1999, 2nd Edition, Automatic Fire Detection and Fire Alarm Systems.
- 4) ISO 9000 Certifications.
- 5) All facility type dedicated Italian fire prevention norms in force (Hotels, Schools, Garages, etc.)
- 6) C.E.I. and C.E. norms in force.

Recommended Web sites

- 1) Factory Mutual Global (FM) (<http://www.fmglobal.com>)
- 2) International Conference of Building Officials, publishers of the Uniform Building Code (UBC), (<http://www.icbo.org>)

- 3) National Fire Protection Association (NFPA) (<http://www.nfpa.org>)
- 4) National Institute of Building Sciences (NIBS), producers of the "Construction Criteria Base" (CCB). (<http://www.nibs.org>): (<http://www.ccb.org/html/home.html>)
- 5) Occupational Safety & Health Administration (OSHA) (<http://www.osha.gov/comp-links.html>)
- 6) Society of Fire Protection Engineers. Inc. (SFPE) (<http://www.sfpe.org>)
- 7) Underwriters Laboratories Inc. (UL) (<http://www.ul.com/welcome.html>)

19.1.8 Chapter 11 — Civil Design

Line Crossings

- 1) Army Corps TI 814-10, Waste Water Collection, (Aug 1998)

Gas Lines

- 1) UNI 4437 Series S 5 for HDPE gas distribution pipes
- 2) ANSI B 16-40 1985 (R1994)
- 3) AFNOR NFT 5467
- 4) ISO 9393
- 5) EN 1555
- 6) DIN 323
- 7) CEN/TC 155 W 1034 PART 4

Fuel Oil Storage & Lines

- 8) Italian Final Governing Standards (FGS) (a copy should be available in the 31 CES/CEV office)

19.1.9 Chapter 12 – Structural Design

Structures

- 1) Law, 5 November 1971, No.1086, "Norms governing the discipline of normal, reinforced and prestressed concrete structures, and steel structures."
- 2) Decree of the Ministry of Public Works, 9 January 1996, "Technical Requirements for the Design, Execution, and Testing of normal reinforced and prestressed concrete structures, and steel structures."
- 3) Circular of the Ministry of Public Works, 14 February 1974, No.11951, "Norms Governing the Discipline of Normal, Reinforced and Prestressed Concrete Structures, and Steel Structures. Instructions for Applicability."
- 4) Circular of the Ministry of Public Works, 31 July 1979, No.19581, "Law No.1086, art.7 — Static Verification."
- 5) Circular of the Ministry of Public Works, 23 October 1979, No.19777, "Administrative Procedures: Law n°.1086 dated 11/5/1971 and Law n°. 64 dated 2/2/1974."
- 6) Circular of the Ministry of Public Works, 9 January 1980, No. 20049, "Law, 11/5/1971, No.1086 — Instructions for testing on concrete employed in reinforced concrete structures."

- 7) Circular of the Ministry of Public Works, 15 October 1996, No. 252, "Instructions for the application of "Technical Requirements for the Design, Execution and Testing of normal reinforced and prestressed concrete structures, and steel structures," contained in Ministerial Decree dated 9 January 1996."

Seismic Structural Design

- 8) Law, 2 February 1974, No. 64 "Provisions for Constructions with Specific Requirements for Seismic Zones."
- 9) Decree of the Ministry of Public Works, 16 January 1996, "Technical Requirements for Constructions in Seismic Zones."
- 10) Presidency of the Public Works Advisory Council, Central Technical Services, "Guidelines for the Design, Execution and Testing of Structures with Seismic-Joints."

Masonry Structures

- 11) Decree of the Ministry of Public Works, 20 November 1987, "Technical Requirements for the Design, Execution and Testing of Masonry Structures and their Reinforcement."
- 12) Circular of the Ministry of Public Works, 4 January 1989, No. 30787, "Instructions Concerning the Technical Requirements for the Design, Execution and Testing of Masonry Structures and their Reinforcement."

Prefabricated Structures

- 13) Decree of the Ministry of Public Works, 20 November 1987, "Technical Requirements for the Design, Execution and Testing of Prefabricated Structures."
- 14) Circular of the Ministry of Public Works, 16 March 1989, No. 31104, "Instructions Concerning the Technical Requirements for the Design, Execution and Testing of Prefabricated Structures."

Snow and Wind Load Criteria

- 15) Decree of the Ministry of Public Works, 16 January 1996, "Technical Requirements Concerning General Criteria for the Verification of Structural Safety and the Verification of Loads and Superimposed Loads."
- 16) Circular of the Ministry of Public Works, 4 July 1996, No. 156AA.GG./STC., Instructions for the Actuation of Technical Requirements Concerning the General Criteria for the Verification of Structural Safety and the Verification of the Loads and Superimposed Loads as Specified in Ministerial Decree, 16 January 1996."

Soils and Foundations

- 17) Decree of the Ministry of Public Works, 11 March 1988, "Technical Requirements Concerning the Surveys on Soils and Rocks, the Stability of Natural Gradients and Slopes, the General Criteria and Prescriptions for the Design, Execution and Verification of Earth Supporting Structures and Foundations."

- 18) Circular of the Ministry of Public Works, 24 September 1988, No. 30483, "Law, 2 February 1974, No. 64, article 1 Ministerial Decree, 11 March 1988, Instructions concerning the Surveys on Soils and Rocks, the Stability of Natural Gradients and Slopes, the General Criteria and Prescriptions for the Design, Execution and Verification of Earth Supporting Structures and Foundations."
- 19) State Council — General Meeting, 2 June 1994, "Professional Responsibilities of Engineers and Geologists for the Compilation of Geological and Geotechnical Surveys."
- 20) Circular of the Ministry of Public Works, 9 January 1996, No. 218/24/3, "Law, 2 February 1974, No. 64, Public Works Ministerial Decree, 11 March 1988. Applicative Instructions for the Compilation of Geological and Geotechnical Reports."

19.1.10 Chapter 13 — Mechanical Design

Operating & Maintenance (O&M) Manuals & Personnel Training

- 1) ETL 89-2

Corrosion Control

- 2) Engineering Technical Letter ETL 91-6: cathodic protection
- 3) Protective Coatings
- 4) Italian standards: all protective coatings and surface treatments shall be clearly described on specifications with reference to.

Fuel Oil Storage & Lines

- 5) Final Governing Standards (FGS), a copy is available in the 31 CES/CEV office.

Utility Metering

- 6) ETL 94-2.

Air-conditioning

- 7) MIL-HDBK-1190
- 8) ASHRAE: air supply and exhaust rates

Industrial Ventilation

- 9) A Manual of Recommended Practice, latest edition, American Conference of Governmental Industrial Hygienists
- 10) Department of Energy Standards, Part 435, Energy Conservation Voluntary Performance Standards for New Buildings.
- 11) DoE 435 (Energy conservation performance standard)
- 12) Law 10/91 for Energy Conservation

19.1.11 Chapter 14 — Electrical Design

Electrical Meters

- 1) ETL 94-2.

Automatic backup generators

- 2) AFH 32-1084

Lightning Protection System

- 3) CEI 81-1

Low Voltage Distribution & Switchgear

- 4) CEI 64-8

Illumination Ratings for Fluorescent Lamps

- 5) Illuminance Values & Recommended Lamp Types according to UNI Recommendation U29.00.008.0

Emergency Lighting

- 6) USAFE ETLs

Italian Electrotechnical Committee (CEI) Publications

- 7) CEI CT-3 Graphic signs
- 8) CEI 11-8, Generation, transmission, and distribution systems of electric power. Grounding systems.
- 9) CEI 11-17, Electric power generation, transportation and distribution systems. Cable lines.
- 10) CEI 14-4, Power transformers
- 11) CEI 16-2, Identification of apparatus terminals
- 12) CEI 17-5, Automatic circuit breakers for rated voltages not greater than 1000V a.c. and 1200 V d.c.
- 13) CEI 17-11, Operating switches, disconnectors air, breakers-disconnectors and fuses, combined units for rated voltage not greater than 1000 V a.c. and 1200 V d.c.
- 14) CEI 17-13, Low voltage switchgear and controlgear assemblies. Part 1: Requirements for totally and partially tested assemblies.
- 15) CEI 23-3, Overcurrent automatic circuit breakers for domestic appliances and similar (for rated voltage not greater than 415 V a.c.

- 16) CEI 23-5, Plug-outlets for domestic appliances and similar.
- 17) CEI 23-12, Plug outlets for industrial appliances.
- 18) CEI 23-18, Ground fault breakers for domestic appliances and similar, and ground fault breakers with integral overcurrent releases for domestic appliances and similar.
- 19) CEI 23-25, Conduits for electrical installations. Part 1: general requirements.
- 20) CEI 23-28, Conduits for electrical installations. Part 2: special norms for conduits. Section — Metallic conduits.
- 21) CEI 64-2, Electrical installations in locations with explosion hazard
- 22) CEI 64-8, Electrical system with rated voltages not greater than 1000 V a.c. and 1500 V d.c.
- 23) CEI 17-13/2, Low voltage switchgear and control gear assemblies. Part 1: Requirements for totally and partially type-tested assemblies.
- 24) CEI 70-1, Degree of protection of the enclosures. Classification.
- 25) UNEL 35747, Energy cable polyvinylchloride insulated.

Italian National Institute for the Unification of Standards (UNI) Publications

UNI 10439, Lighting Technology — Lighting Technique Requirements for the Motorized Traffic Streets.

Laws, Circulars and Decrees
- 26) D.P.R. 547 Accident prevention norms

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- 27) D.P.R. 689 Factories and works subject to fire department control.
- 28) Law, 5 March 1990, No.46, Norms for the safety, design, installation and maintenance of the technical systems.
- 29) Law, 1 March 1968, No.186, Norms related to the production of materials, equipment, machineries, installation and electrical and electronic systems.
- 30) Legislative Decree, 19 September 1994, No.626, Actuation of instructions 89/ 391/ CEE, 89/654/ CEE, 89/655/CEE, 89/656/CEE, 90/269/CEE, 90/270/CEE, 90/394/CEE and 90/679/CEE concerning the improvement of safety and health of workers at work site.
- 31) Law 10/91 for Energy Conservation
- 32) All Italian, CE, CEI, UNI and ISO norms in force.
- 33) National Fire Protection Association
- 34) DoE 435 (Energy conservation performance standard)
- 35) NFPA 70, 1996 National Electrical Code
- 36) US Standard and Publications
- 37) P-355, Seismic Design for Buildings, NAVFAC, Department of the Navy.
- 38) International Conference of Building Officials
- 39) UBC, Uniform Building Code 1994, Vol.3.

19.1.12 Chapter 15 — Communications Standards

Codes

- 1) Emerald Book for Equipment Grounding, NFPA-70/NEC, National Electric Code
- 2) Outside Plant Installation Safety Guide, NESC (ANSI/IEEE C-2), National Electric Safety Code

United States Standards

- 3) ANSI/TIA/EIA-568-B and All Addenda, Commercial Building Telecommunications Cabling Standard, 2001 (Includes System Testing Requirements)
- 4) ANSI/TIA/EIA-569-A, Commercial Building Standard for Telecommunications Pathways and Spaces
- 5) ANSI/TIA/EIA-598-A, Optical Fiber Cable Color Coding
- 6) ANSI/TIA/EIA-606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- 7) ANSI/TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications
- 8) RUS 1755 (Formerly REA) Rural Utilities Service, Telecommunications Standards and Specifications for Materials, Equipment, and Construction. Outside Plant Standards (Cable, Splicing, Installation, etc.)

International Standards

- 9) International Organization for Standardization (ISO)
- 10) International Electrotechnical Commission (IEC)
- 11) ISO/IEC 11801, Information Technology — Generic Cabling for Customer Premises

European Standards

- 12) Comité Européen de Normalisation Electrotechnique (CENELEC)
- 13) CENELEC EN 50173, Information Technology — Generic Cabling Systems
- 14) CENELEC EN 50174, Information Technology — Cabling Installation, 2000

19.1.13 Chapter 16 — Environmental Standards

- 1) Department of Defense Environmental Final Governing Standards (FGS) for Italy, Jan 2002
- 2) Italian Legislative Decree, 11 May 1999, No.152
- 3) AFI 32-7080 — Pollution Prevention Program
- 4) ETL 95-4 — Energy Saving Lighting
- 5) ETL 95-4 — Flow limiting devices in Lavatories
- 6) CE Environmental Flight Web Page: www.aviano.af.mil/index.html

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19.1.14 Chapter 17 — General Provisions for Construction

Safety

Italian Standards

- 1) Legislative Decree, 19 September 1994, No.626
- 2) Legislative Decree, 14 August 1996, No.494 / 528
- 3) Ministerial Decree, 10 March 1998, General requirements for fire protection safety and the control of emergencies in work places.
- 4) Ministerial Decree, 4 May 1998, Regulations for the compilation and presentation of fire prevention documents as well as the related services delivered by the Provincial Fire Department Comand (Comandi Provinciali dei Vigili del Fuoco).

United States Standards

- 1) AFOSH Standard 127-22, 28 September 92, Chapters 2 &3
- 2) AFOSH 127-32

19.2.0 Acronyms

A/E	Architect/Engineer
AAFES	Army and Air Force Exchange Service
AB	Air Base
ADAAG	Americans with Disabilities Act Architectural Guidelines
AFCEE	Air Force Center for Environmental Excellence
AFFF	Aqueous Film Forming Foam
AFH	Air Force Handbook
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational and Environmental Safety, Fire Protection and Health
AFPM	Air Force Pamphlet Manual
AFR	Air Force Requirement
AIC	Amperage Intensity Current
AICUZ	Air Installation Compatible Use Zone
AMDS	Aerospace Medicine Squadron
ANSI	American National Standards Institute
ARR	Appearance Retention Rating
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air -Conditioning Engineers, Inc.
ASL	Azienda Sanitaria Locale (Local Italian Health Authority)

ASME	American Society of Mechanical Engineers
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
AT/FP	Antiterrorist/Force Protection
BX	Base Exchange
CADD	Computer Aided Design Drafting
CATV	Community Area Television
CC	Commander
CCB	Construction Criteria Base
CE	Civil Engineer
CEC	Engineering Flight Chief
CECA	Admin Support Engineering Flight
CECC	Contract Engineering Flight
CECM	Construction Manager Engineering Flight
CECP	Base Planning/Development Engineering Flight
CEF	Base Fire Chief
CEI	Comitato Elettrotecnico Italiano (Italian Electrotechnical Committee)
CENELEC	Comité Européen de Normalisation Electrotechnique (European Committee for Electrotechnical Standardization)
CEO	Flight Commander Operations Flight
CEOIW	Civil Engineer Operations Infrastructure Water

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CES	Civil Engineer Squadron	FSP	Final Sketch Plan	MUTCD	Manual on Uniform Traffic Control Devices
CEV	Civil Engineer Environmental	FW	Fighter Wing	MV	Medium Voltage
CMU	Concrete Masonry Unit			MWR	Moral, Welfare, and Recreation
COMM	Communications	GIS	Geographical Information System		
CS	Communications Squadron	GPS	Global Positioning System		
				NATO	North Atlantic Treaty Organization
DIN	Deutsche Industrie Normen (German Industrial Standards)	HDPE	High Density Polyethylene	NAVFAC	Naval Facilities
		Hi-X	High-Expansion	NEC	National Electrical Code
DoD	Department of Defense	HQ	Headquarters	NESC	National Electric Safety Code
DoDDS	Department of Defense Dependents Schools	HVAC	Heat Ventilation Air Conditioning	NFC	National Fire Code
		HW	Hazardous Waste	NFPA	National Fire Protection Association
DPR	Decree of the President of the Republic of Italy			NIBS	National Institute of Building Sciences
		IDS	Intruder Detection System		
ECP	Entry Control Point	IMQ	Italian Mark of Quality	O&M	Operation and Maintenance
EEC	European Economic Community	IP	International Protection	ODC	Ozone Depleting Chemicals
EIA	Electronic Industries Association	IPC	International Plumbing Code	OPORD	Operations Order
EIFS	Exterior Insulation Finish System	ISO	International Organization for Standardization	Ops	Operations
EMCS	Energy Monitoring Control System	IWW	Industrial Waste Water	OSHA	Occupational Safety and Health Administration
EN	European Norm			OWS	Oil/Water Separator
EPA	Environmental Protection Agency	LAN	Local Area Network		
ETL	Engineering Technical Letter	LPS	Lightning Protection System	PCI	Personal Computer Interface
		LV	Low Voltage	PDM	Pre-Design Meeting
FF	Federal Flammability			PE	Polyethylene
FFA	Federal Flammability Agency	MDOS	Medical Operations Squadron	PIV	Post Indicator Valve
FFE	Finished Floor Elevation	MIL HDBK	Military Handbook	PMO	Project Management Office
FGS	Final Governing Standards	MSDS	Material Safety Data Sheet	POC	Point of Contact
FM	Factory Mutual	MTF	Medical Treatment Facility	POL	Petroleum, Oil ,and Lubricants
FOC	Fiber Optic Cable				

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POV	Privately Owned Vehicle	TN-S	Terra Neutro – Separati (Separate Grounding Neutral)
PSP	Preliminary Sketch Plan		
PVC	Polyvinyl Chloride		
PXI	Personal Computer Interface Extension	UBC	Uniform Building Code
		UFAS	Uniform Federal Accessibility Standards
		UFC	United Facilities Criteria
Q.O.L.	Quality of Life	UL	Underwriters Laboratories
		UNEL	Electrotechnical Standardization
R	Thermal resistance	UNI	Ente Nazionale Italiano di Unificazione (Italian National Institute for Unification of Standards)
RAL	Reichsausschuß für Lieferbedingungen (German Institute of Quality Assurance and Labeling)		
Rck	Characteristic Strength	UPC	Uniform Building Code
RUS	Rural Utilities Service	UPS	Uninterrupted Power Supply
		USAFE	United States Air Force Europe
SATO	Scheduled Airline Traffic Office	USEUCOM	United States European Command
SCMPC	Communications Squadron - Cable Maintenance	VAV	Variable Air Volume
SCX	Communications Squadron - Plans and Implementation Flight	VCT	Vinyl Composition Tile
		Vn	Nominal Voltage
SFPE	Society of Fire Protection Engineers	VOC	Volatile Organic Compound
SFS	Security Forces Squadron	VQ	Visiting Quarters
SPT	Standard Penetration Test		
STC	Sound Transmission Coefficient		
TIA	Telecommunications Industries Association		
TLF	Temporary Living Facility		
TMO	Transportation Management Office		

CHAPTER 3 — COMPREHENSIVE PLANNING CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

3.1.0 General (Unifying elements)

- | | | | | |
|---------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Edges | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Routes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Open Space | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

3.2.0 Base General Plan (Parts to a whole)

- | | | | | |
|------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Adjacent land uses | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Airfield surfaces | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Noise impact | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Explosive distance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Circulation systems | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Infrastructure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Future development | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

- | | | | | |
|----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Functional siting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Adequate infrastructure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Expansion addressed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Natural features | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) View protection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

3.4.0 Edges and Boundaries

- | | | | | |
|--------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Rural/open | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Urban | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Buffer planting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Views in/out | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Buffer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Transition | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Yes No N/A Rev.Cmt.

3.5.0 Routes

- | | | | | |
|-------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Road character | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Arrival | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Focal points | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Network | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

3.6.0 Open Space

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Vegetation protection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Building surrounds | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Linked spaces | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Definition | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

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CHAPTER 4 – SECURITY DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

4.4.0 Sitework Elements

- | | | | | |
|-----------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Hiding places | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Clear view | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Asset location | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Signage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Separation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Approach | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) No parking below | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Utility access | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 9) Parking visibility | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 10) Vehicle access | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

4.5.0 Building Elements

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Asset location | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Hiding places | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Traffic views | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Asset location | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Asset location | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Mailroom location | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Glazing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Security doors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 9) Reentrance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 10) Mechanical rooms | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 11) Ventilation security | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 12) HVAC location | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

4.5.1

Vaults & Armories (reqts.) ☐ ☐ ☐ _____

4.6.0 Perimeter control

- | | | | | |
|----------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Main gate traffic | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Entrance drives | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Guard house | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Pull-offs | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Yes No N/A Rev.Cmt.

- | | | | | |
|--------------------|--------------------------|--------------------------|--------------------------|-------|
| 5) U-turns | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Gate security | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Active barriers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

4.6.1 Barricades and Passive Barriers

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Guard house | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Disguising | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Passive barriers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Integrated appearance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

4.6.2 Fencing

- | | | | | |
|-------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Height standard | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) "Priority A" fencing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Fence base | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Reinforcing cabling | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

4.7.0 Lighting

- | | | | | |
|-------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Lighting provided | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Coordination with SF | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

4.7.1

Perimeter and ECP Lighting ☐ ☐ ☐ _____

4.7.2

Facility Lighting (sufficient) ☐ ☐ ☐ _____

4.7.3

Area Lighting (area/spot) ☐ ☐ ☐ _____

4.8.0 Intruder Detection System (IDS)

- | | | | | |
|-------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Base standard | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Coordination with SF | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

4.9.1 Landforms

- | | | | | |
|----------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Define boundaries | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Vehicle barricade | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Yes No N/A Rev.Cmt.

- | | | | | |
|------------------------|--------------------------|--------------------------|--------------------------|-------|
| 3) Foot aggression | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Obscured sightlines | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Asset distancing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

4.9.2

Berms (design) ☐ ☐ ☐ _____

4.9.3 Ditches, Swales and Depressions

- | | | | | |
|-----------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Slope requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Ditch integration | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

4.9.4 Protective Planting

- | | | | | |
|----------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Purposeful design | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Plant selection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

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CHAPTER 5 — SITE DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

5.1.2 Site Analysis

- | | | | | |
|---------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Siting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Overall Sense | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Outdoor spaces | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Balance, scale | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Multi-storied | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Future expansion | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.1.3 Siting Requirements

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Advantage of features | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Protect from elements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Window orientation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Passive heat/cool | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Views | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Approach and arrival | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.2.1 Pedestrian Systems

- | | | | | |
|---------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Sidewalks/Squares | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Safety | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Connections | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Jog/bike integration | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Entry linking | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Internal cttyd. access | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Gathering | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Parallel circulation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 9) Conflict avoidance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 10) Where required | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 10) Adequate width | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 12) Accessibility | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 13) Special paving | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 14) Concrete pavers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.2.2

Primary Walks (character) ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

5.2.3

Secondary Walks (character) ☐ ☐ ☐ _____

5.2.4

Tertiary Walks (character) ☐ ☐ ☐ _____

5.2.5 Passive Outdoor Areas

- | | | | | |
|----------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Areas as required | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Pavilions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Pavilion style | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Amenities | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Smoking areas | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.2.6 Bicycle Systems

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Path coordination | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Isolation/Demarcation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Jog/bike integration | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Curb cuts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.2.7 Vehicular Systems

- | | | | | |
|-------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Adequate access | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Entrance medians | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Curbs/gutters | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Coordination w/31CES | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.2.8 Shuttle Bus Service

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Shelters/walks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Design requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Coord. w/Base planner | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.2.9 Emergency Vehicle Access

- | | | | | |
|---------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Adequate bldg. spacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Vehicle requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Yes No N/A Rev.Cmt.

5.2.10 Service Access

- | | | | | |
|------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Load accommodation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Walkways as service | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Interlocking pavers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Grasscrete pavers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Separate entrances | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Views screened | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Screen yards | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.2.11 Intersections

- | | | | | |
|------------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Meeting angles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Sight triangles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Plant material setbacks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Avoid multi-legging | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Demarcation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Parking access | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Pedestrian safety | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Parking/street separation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 9) Right-of-way definition | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.3.1 General (Vehicle Parking)

- | | | | | |
|-----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Primary surfacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Special pedestrian walks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Visual variation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Landscaping | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Safe circulation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

5.3.2 Perimeters

- | | | | | |
|----------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Definition | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Signage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Visual separation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

CHAPTER 5 — SITE DESIGN CHECKLIST

	Yes	No	N/A	Rev.Cmt.
5.3.3 Design and Dimensions				
1) Multi-level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Expansion addressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Physical separation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Appropriate curbs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Typical stall sizing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Compact stall sizing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8) Stall angling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9) Loading dock sizing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
10) One way drive sizing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
11) Two way drive sizing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
12) Appropriate slope	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13) Walk sizing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14) Overall space planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
15) Facility sharing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
16) Safe layout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
17) On street parking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.3.4 Privately Owned Vehicle Parking				
1) HQ/Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Shops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.3.5 Motorcycle Parking (design)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.3.6 Bicycle Parking				
1) Rack provision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Appropriate location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.3.7 Parking for Disabled Persons				
1) Agency compliance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Convenient Location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.4.1 General				
1) Maintenance response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Timed switching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

	Yes	No	N/A	Rev.Cmt.
5.4.2 Pedestrian Lighting				
1) Fixture heights	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Vandalism response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Stair, secondary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.4.3 Special Purpose Lighting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.4.4 Feature Lighting				
1) Accent response	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Arcade/building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.5.2 General Grading (transition)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.5.3 Storm Drainage				
1) Underground system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) 100% interception	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Retention/erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Drop inlets as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Oil/water separator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) System separation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.5.4 Landforms				
1) Obscure/soften	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Enhance drainage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Interest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Berm design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.1 Fences, Screens and Walls				
1) Appropriate use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Minimal pedestrian use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Material suitability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.2 Paving				
1) Appropriate location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Interest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.3 Bus Shelters				
1) Design conformity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Minimum accessories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

	Yes	No	N/A	Rev.Cmt.
3) Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.4 Picnic Shelters				
1) Design character	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) CES Review	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) No wooden gazebos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.6 Vending Machines				
1) Placement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Screening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.7 Seating				
1) Location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Feature incorporation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Minimum requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Base standard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Alternative provision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.8 Bicycle Racks				
1) Base standard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Surfacing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.9 Bollards				
1) Pedestrian protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Equipment protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.10 Trash Receptacles				
1) Receptacle location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Dumpster screening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.11 Planters				
1) Appropriate design use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Uniform design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Bollard substitution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5.6.12 Tree Grates				
1) Location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Edge definition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Proper sizing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

CHAPTER 6 — LANDSCAPE DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

6.2.0 General Guidelines

- | | | | | |
|-----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Raised beds | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Entrance interest | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Dual purpose (as req'd.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Massing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Spacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Proximity | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Curb design | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Material selection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 9) Material balance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 10) Color scheme | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

6.3.0 Landscape Development Zones

- | | | | | |
|-----------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Primary | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Secondary | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Tertiary | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| | | | | |
| 1) Hardscape blending | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Softening elements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

6.4.1 Primary Streets

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Roads landscaped | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Intersections landsc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Sidewalk separation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Medians landscaped | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Sightline to signage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Appropriate spacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Minimum sizing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Appropriate selection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Yes No N/A Rev.Cmt.

6.4.2 Secondary Streets

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Sidewalk separation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Lighting/signage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Siteline to signage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Appropriate spacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Appropriate selection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

6.4.3 Tertiary Streets

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Appropriate groupings | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Appropriate spacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Setback | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Minimum sizing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Appropriate selection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

6.5.0 Foundation Plantings

- | | | | | |
|------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Appropriate heights | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Hierarchy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Deciduous screening | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Open views | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Appropriate use | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

6.6.0 Screen Plantings

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Upright selections | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Appropriate sizing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Seasonal interest | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Appropriate selection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

6.6.1 Evergreen Trees

- | | | | | |
|------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Integration | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Minimum screening | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Appropriate spacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Appropriate height | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Yes No N/A Rev.Cmt.

6.6.2 Deciduous Trees

- | | | | | |
|------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Appropriate spacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Minimum caliper | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) No Chestnut trees | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

6.6.3 Shrubs

- | | | | | |
|-------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Screen spacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Mass spacing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

6.7.0 Grass Seed Mix (as recommended)

- | | | | |
|--------------------------|--------------------------|--------------------------|-------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
|--------------------------|--------------------------|--------------------------|-------|

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CHAPTER 7 — SIGNAGE CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

7.2.0 General Guidelines

- | | | | | |
|----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Conformity | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Color correctness | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Traffic sign conformity | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) No advertisement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

7.3.0

Sign Control Group (coord.) ☐ ☐ ☐ _____

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CHAPTER 8 — ARCHITECTURAL DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

8.4.0 Building Forms and Proportion

- 1) Responsive shapes ☐ ☐ ☐ _____
- 2) Façade proportion ☐ ☐ ☐ _____
- 3) Heirarchy ☐ ☐ ☐ _____
- 4) Simplicity ☐ ☐ ☐ _____
- 5) Wall interest ☐ ☐ ☐ _____
- 6) Appropriate scale ☐ ☐ ☐ _____

8.4.1 Mass and Scale

- 1) Unity/order ☐ ☐ ☐ _____
- 2) Avoidance of large mass ☐ ☐ ☐ _____
- 3) Wall interest ☐ ☐ ☐ _____
- 4) Front-to-back heirarchy ☐ ☐ ☐ _____
- 5) Scale compatibility ☐ ☐ ☐ _____
- 6) Appropriate scale ☐ ☐ ☐ _____

8.4.2 Public Squares and Courtyards

- 1) Proportions ☐ ☐ ☐ _____
- 2) Function ☐ ☐ ☐ _____
- 3) Boundaries ☐ ☐ ☐ _____
- 4) Future impact ☐ ☐ ☐ _____

8.4.3 Colonnaded Arcades

- 1) Visual interest ☐ ☐ ☐ _____
- 2) Cultural response ☐ ☐ ☐ _____
- 3) Scale ☐ ☐ ☐ _____
- 4) Design ☐ ☐ ☐ _____
- 5) Connection ☐ ☐ ☐ _____

8.4.4 Roofs

- 1) Slope ☐ ☐ ☐ _____
- 2) Shape ☐ ☐ ☐ _____
- 3) Eave variation ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

- 4) Approved flat design ☐ ☐ ☐ _____
- 5) Tile (material) ☐ ☐ ☐ _____
- 6) Standing seam ☐ ☐ ☐ _____
- 7) Gutters/downspouts ☐ ☐ ☐ _____
- 8) Appurtenance matching ☐ ☐ ☐ _____
- 9) Skylights discouraged ☐ ☐ ☐ _____

8.5.1 Walls

- 1) Visual interest ☐ ☐ ☐ _____
- 2) Avoidance of large mass ☐ ☐ ☐ _____
- 3) Material continuity ☐ ☐ ☐ _____

8.5.2 Fenestration

- 1) Appropriate framing ☐ ☐ ☐ _____
- 2) Frame definition ☐ ☐ ☐ _____
- 3) Appropriate sill material ☐ ☐ ☐ _____
- 4) Appropriate scale ☐ ☐ ☐ _____
- 5) Coord. w/interior spaces ☐ ☐ ☐ _____
- 6) Material continuity ☐ ☐ ☐ _____

8.5.3 Entrances

- 1) Visual identification ☐ ☐ ☐ _____
- 2) Recess as required ☐ ☐ ☐ _____
- 3) Shelter ☐ ☐ ☐ _____
- 4) Material continuity ☐ ☐ ☐ _____

8.5.4 Materials

- 1) Cultural response ☐ ☐ ☐ _____
- 2) Appropriate wall material ☐ ☐ ☐ _____
- 3) Exterior durability ☐ ☐ ☐ _____
- 4) Low-maintenance ☐ ☐ ☐ _____
- 5) Approved marble ☐ ☐ ☐ _____
- 6) Exposed metals ☐ ☐ ☐ _____
- 7) Window material ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

- 8) Approved glazing ☐ ☐ ☐ _____
- 9) Approved doors ☐ ☐ ☐ _____

8.5.9 Colors of Miscellaneous Exterior Elements

- 1) Window trim ☐ ☐ ☐ _____
- 2) Railing ☐ ☐ ☐ _____
- 3) Downspouts ☐ ☐ ☐ _____
- 4) Fascias ☐ ☐ ☐ _____
- 5) Gutters ☐ ☐ ☐ _____
- 6) Primary doors/frames ☐ ☐ ☐ _____
- 7) Secondary doors ☐ ☐ ☐ _____
- 8) Louvers ☐ ☐ ☐ _____
- 9) Metal trim ☐ ☐ ☐ _____
- 10) Post Indicator Valves ☐ ☐ ☐ _____
- 11) Exposed appurt. ☐ ☐ ☐ _____
- 12) No graphics ☐ ☐ ☐ _____

8.6.0 Passive Design

- 1) Shade response ☐ ☐ ☐ _____
- 2) Adjacent structures ☐ ☐ ☐ _____
- 3) Cross ventilation ☐ ☐ ☐ _____
- 4) Proper axis ☐ ☐ ☐ _____
- 5) Avoidance of heat gain ☐ ☐ ☐ _____
- 6) Use of plant materials ☐ ☐ ☐ _____
- 7) Avoidance of glare ☐ ☐ ☐ _____
- 8) Transition zones ☐ ☐ ☐ _____
- 9) Berming (if used) ☐ ☐ ☐ _____
- 10) Functional buffering ☐ ☐ ☐ _____
- 11) Ceiling/insulation ☐ ☐ ☐ _____
- 12) Thermal glass ☐ ☐ ☐ _____
- 13) Operable windows ☐ ☐ ☐ _____
- 14) Roof ventilation ☐ ☐ ☐ _____

CHAPTER 8 — ARCHITECTURAL DESIGN CHECKLIST

	Yes	No	N/A	Rev.Cmt.
15) Daylighting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
16) Code conformity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8.7.0				
Disabled Accessibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8.8.0 Support Spaces				
1) Administration areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Maintenance spaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Communication rooms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Mechanical rooms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Others as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8.9.0 Door Hardware				
1) Base standard locks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Panic hardware	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Heavy-duty as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Code conformity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Standardized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

CHAPTER 9 — INTERIOR DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

9.3.0

Product Requirements

☐ ☐ ☐ _____

9.3.1

Durability (addressed)

☐ ☐ ☐ _____

9.3.2

Maintenance (addressed)

☐ ☐ ☐ _____

9.3.3

Aesthetics (selection)

☐ ☐ ☐ _____

9.3.4

Quality (selection)

☐ ☐ ☐ _____

9.4.0

Finish Materials

☐ ☐ ☐ _____

9.4.1 Flooring

- 1) Function/aesthetics ☐ ☐ ☐ _____
- 2) Appropriate finishes ☐ ☐ ☐ _____
- 3) Raised systems ☐ ☐ ☐ _____
- 4) Walk-off mats ☐ ☐ ☐ _____
- 5) Base materials ☐ ☐ ☐ _____
- 6) Maintenance addressed ☐ ☐ ☐ _____
- 7) Tile/rugs ☐ ☐ ☐ _____
- 8) Vinyl as required ☐ ☐ ☐ _____

9.4.2 Sheet Vinyl

- 1) Appropriate selection ☐ ☐ ☐ _____
- 2) Appropriate color ☐ ☐ ☐ _____
- 3) Appropriate finish ☐ ☐ ☐ _____
- 4) Appropriate base ☐ ☐ ☐ _____
- 5) Installation specification ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

9.4.3 Vinyl Composition Tile

- 1) Appropriate selection ☐ ☐ ☐ _____
- 2) Appropriate finish ☐ ☐ ☐ _____
- 3) Installation specification ☐ ☐ ☐ _____
- 4) Appropriate color ☐ ☐ ☐ _____
- 5) Appropriate placement ☐ ☐ ☐ _____
- 6) Creative use ☐ ☐ ☐ _____
- 7) Consider sheet goods ☐ ☐ ☐ _____

9.4.4 Ceramic Floor Tile

- 1) Tile selection ☐ ☐ ☐ _____
- 2) Appropriate use ☐ ☐ ☐ _____
- 3) Non-slip for traffic ☐ ☐ ☐ _____
- 4) Appropriate sizing ☐ ☐ ☐ _____
- 5) Grout selection ☐ ☐ ☐ _____
- 6) Appropriate color ☐ ☐ ☐ _____
- 7) Appropriate base ☐ ☐ ☐ _____

9.4.5 Carpet

- 1) Appropriate use ☐ ☐ ☐ _____
- 2) Air Force standards met ☐ ☐ ☐ _____
- 3) Threshold ☐ ☐ ☐ _____
- 4) Appropriate selection ☐ ☐ ☐ _____
- 5) Quality selection ☐ ☐ ☐ _____
- 6) Color/pattern selection ☐ ☐ ☐ _____
- 7) Appropriate color ☐ ☐ ☐ _____
- 8) Walk-off mats ☐ ☐ ☐ _____
- 9) Specifications met ☐ ☐ ☐ _____
- 10) Fire resistance ☐ ☐ ☐ _____
- 11) Appropriate upgrades ☐ ☐ ☐ _____
- 12) Face weight ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

9.4.6

Concrete or CMU Walls

☐ ☐ ☐ _____

9.4.7 Wall Covering

- 1) Fire rating ☐ ☐ ☐ _____
- 2) Edge/corner installation ☐ ☐ ☐ _____
- 3) Flame spread regulation ☐ ☐ ☐ _____
- 4) Maintenance ☐ ☐ ☐ _____
- 5) No carpet ☐ ☐ ☐ _____
- 6) Type selection ☐ ☐ ☐ _____
- 7) Installation specification ☐ ☐ ☐ _____
- 8) Type selection ☐ ☐ ☐ _____
- 9) High traffic areas ☐ ☐ ☐ _____
- 10) Priming ☐ ☐ ☐ _____
- 11) Acoustic as appropriate ☐ ☐ ☐ _____
- 12) Acoustic fire rating ☐ ☐ ☐ _____
- 13) Fabric as appropriate ☐ ☐ ☐ _____

9.4.8 Ceramic Wall Tile

- 1) Appropriate selection ☐ ☐ ☐ _____
- 2) Wet area usage ☐ ☐ ☐ _____
- 3) Floor-to-ceiling ☐ ☐ ☐ _____
- 4) Design features ☐ ☐ ☐ _____
- 5) Appropriate trim-out ☐ ☐ ☐ _____

9.4.9 Wood Paneling

- 1) Fire rating ☐ ☐ ☐ _____
- 2) Appropriate trim-out ☐ ☐ ☐ _____
- 3) Appropriate use ☐ ☐ ☐ _____
- 4) Flame spread ☐ ☐ ☐ _____

CHAPTER 9 — INTERIOR DESIGN CHECKLIST

	Yes	No	N/A	Rev.Cmt.
9.4.10 Wall Panels				
1) Appropriate use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) No pre-finished	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Stripping minimized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Fire rating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.4.11 Wall Base				
1) Appropriate materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Appropriate shapes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.4.12 Miscellaneous Wall Accessories				
1) Recessed equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Conduit, etc. concealed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Electrical accessories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Sealants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Chair rail location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Chair rail height	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.4.13 Ceilings				
1) Appropriate scale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Equipment camouflaged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Recess/hide support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) No metal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.4.14 Acoustic Tile				
1) Appropriate size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Appropriate system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Appropriate upgrades	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) No wall use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Appropriate selection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Appropriate finish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Acoustic rating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.4.15 Gypsum Board				
1) Ceiling use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Appropriate facility use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Moisture resistance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.4.16 Window Covering				
1) Design enhancement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

	Yes	No	N/A	Rev.Cmt..
2) Blind material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Appropriate style	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Appropriate upgrades	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Specification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.5.0 Paints and Coatings				
1) Environmental reqts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Appropriate finish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Epoxy as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Appropriate color	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Acceptable design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.6.0 Colors				
1) Base coordination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Permanent colors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Accent colors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Color variation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Appropriate art selection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Neutral quarters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Light quality consider	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.7.0 Furnishings				
1) Durable, low maint.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Refurbish coordination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Product quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Appropriate materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Simple designs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9.8.0 Lighting				
1) Appropriate ambience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Fixture selection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Color-correct	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Lamps as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Appropriate placement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Appropriate lamping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Appropriate spacing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

CHAPTER 10 – FIRE PROTECTION CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

10.1.0 Governing Standards

- 1) Equip. code compliance ☐ ☐ ☐ _____
- 2) Design code compliance ☐ ☐ ☐ _____
- 3) Warning compliance ☐ ☐ ☐ _____

10.1.1

Fire Alarm Maintenance ☐ ☐ ☐ _____

10.2.0 Water Supply System

- 1) Flow calculation ☐ ☐ ☐ _____
- 2) Flow testing ☐ ☐ ☐ _____
- 3) Dedicated line ☐ ☐ ☐ _____
- 4) Proper exterior connect ☐ ☐ ☐ _____
- 5) Alternate power ☐ ☐ ☐ _____

10.2.1

Riser Entrance (drawing) ☐ ☐ ☐ _____

10.2.2 Back-Flow Prevention Devices

- 1) Required drawings ☐ ☐ ☐ _____
- 2) Location ☐ ☐ ☐ _____
- 3) Approved equipment ☐ ☐ ☐ _____

10.2.3 Post Indicator Valves

- 1) Location ☐ ☐ ☐ _____
- 2) Appropriate substitution ☐ ☐ ☐ _____
- 3) Bollards as required ☐ ☐ ☐ _____

10.2.4 Gate Valves

- 1) Proper type ☐ ☐ ☐ _____
- 2) Alarm inclusion ☐ ☐ ☐ _____

10.2.5 Fire Hydrants

- 1) Regulation compliance ☐ ☐ ☐ _____
- 2) Quantity ☐ ☐ ☐ _____
- 3) Placement ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

- 4) Safe distance ☐ ☐ ☐ _____
- 5) Connection to main ☐ ☐ ☐ _____
- 6) Required connections ☐ ☐ ☐ _____

10.3.0 Standard Requirements

- 1) Appropriate finishes ☐ ☐ ☐ _____
- 2) Separation of const. ☐ ☐ ☐ _____
- 3) Elec/Comm. separation ☐ ☐ ☐ _____
- 4) Partition design ☐ ☐ ☐ _____
- 5) Appropriate penetrations ☐ ☐ ☐ _____
- 6) Detectors ☐ ☐ ☐ _____
- 7) Sprinkler as required ☐ ☐ ☐ _____
- 8) Ventilation system ☐ ☐ ☐ _____
- 9) Pull station requirements ☐ ☐ ☐ _____
- 10) Extinguisher cabinets ☐ ☐ ☐ _____
- 11) Extinguisher specs. ☐ ☐ ☐ _____
- 12) Control panel ☐ ☐ ☐ _____

10.3.1 Exits

- 1) Adequate quantity/size ☐ ☐ ☐ _____
- 2) Adequate signage ☐ ☐ ☐ _____
- 3) Panic hardware ☐ ☐ ☐ _____
- 4) Egress direction ☐ ☐ ☐ _____
- 5) Appropriate finishes ☐ ☐ ☐ _____

10.3.2 Emergency Lighting

- 1) Quantity/placement ☐ ☐ ☐ _____
- 2) Proper function ☐ ☐ ☐ _____

10.3.3 Kitchens

- 1) Hood/duct code comply ☐ ☐ ☐ _____
- 2) Fire suppression ☐ ☐ ☐ _____

10.4.0 Fire Detection and Alarm Systems

- 1) Multi-zone system ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

- 2) Radio linkage ☐ ☐ ☐ _____
- 3) System specification ☐ ☐ ☐ _____
- 4) Panel specification ☐ ☐ ☐ _____
- 5) Battery back-up ☐ ☐ ☐ _____
- 6) All spaces addressed ☐ ☐ ☐ _____
- 7) Detectors/sensors ☐ ☐ ☐ _____
- 8) Single manufacturer ☐ ☐ ☐ _____
- 9) Base approval ☐ ☐ ☐ _____
- 10) Signage ☐ ☐ ☐ _____
- 11) Schedules ☐ ☐ ☐ _____
- 12) Fire Schem. inclusions ☐ ☐ ☐ _____
- 13) Elec./Mech. inclusions ☐ ☐ ☐ _____
- 14) Certification ☐ ☐ ☐ _____

10.5.1 Wet Pipe Sprinkler System

- 1) Code compliance ☐ ☐ ☐ _____
- 2) Areas served ☐ ☐ ☐ _____
- 3) Appropriate location ☐ ☐ ☐ _____
- 4) Test connections ☐ ☐ ☐ _____
- 5) Overage ☐ ☐ ☐ _____

10.5.2 Dry Pipe Sprinkler System

- 1) Appropriate location ☐ ☐ ☐ _____
- 2) Scheduling for install ☐ ☐ ☐ _____

10.5.3

High Expansion Foam ☐ ☐ ☐ _____

10.6.0 Gas Detection and Alarm System

- 1) Alarm panel ☐ ☐ ☐ _____
- 2) Detector ☐ ☐ ☐ _____
- 3) Stop valve ☐ ☐ ☐ _____
- 4) Trip coil ☐ ☐ ☐ _____
- 5) Audio signals ☐ ☐ ☐ _____

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CHAPTER 11 – CIVIL DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

11.2.1 Backfill and fill material

- 1) General quality ☐ ☐ ☐ _____
- 2) Utility backfill quality ☐ ☐ ☐ _____

11.2.2 Compaction

- 1) Reqts. at utilities ☐ ☐ ☐ _____
- 2) Reqts. at trenches ☐ ☐ ☐ _____
- 3) Equipment restrictions ☐ ☐ ☐ _____
- 4) Layer depths ☐ ☐ ☐ _____
- 5) Method specification ☐ ☐ ☐ _____
- 6) % compaction ☐ ☐ ☐ _____
- 7) Lift thickness ☐ ☐ ☐ _____

11.2.3

Grading (restoration)

11.3.1 Existing Utilities

- 1) Drawing inclusions ☐ ☐ ☐ _____
- 2) Ground Scan Radar ☐ ☐ ☐ _____
- 3) Required exclusions ☐ ☐ ☐ _____

11.3.2 Parallel Line Separation

- 1) Low voltage ☐ ☐ ☐ _____
- 2) Medium voltage ☐ ☐ ☐ _____
- 3) Telephone lines ☐ ☐ ☐ _____

11.3.3 Line Crossings

- 1) Sewer vs. drinking ☐ ☐ ☐ _____
- 2) Sewer vs. storage ☐ ☐ ☐ _____
- 3) Sewer/potable proximity ☐ ☐ ☐ _____
- 4) Line construction ☐ ☐ ☐ _____
- 5) Earth separation ☐ ☐ ☐ _____
- 6) Concrete separation ☐ ☐ ☐ _____
- 7) Setback schedule ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

- 8) Protection details ☐ ☐ ☐ _____
- 9) Protection specification ☐ ☐ ☐ _____
- 10) Road crossings ☐ ☐ ☐ _____

11.3.4 Pipe Bedding Details

- 1) Tracing at all lines ☐ ☐ ☐ _____
- 2) Warning tape ☐ ☐ ☐ _____
- 3) Details ☐ ☐ ☐ _____
- 4) Utility markers ☐ ☐ ☐ _____

11.3.5 Utility Meters

- 1) On-site/remote readings ☐ ☐ ☐ _____
- 2) Location ☐ ☐ ☐ _____
- 3) Connection to comm. ☐ ☐ ☐ _____

11.3.6 Protective Bollards

- 1) Proper construction ☐ ☐ ☐ _____
- 2) Height ☐ ☐ ☐ _____

11.4.0 Water Distribution

- 1) Proper welds ☐ ☐ ☐ _____
- 2) Proper joints ☐ ☐ ☐ _____
- 3) Flange location ☐ ☐ ☐ _____
- 4) Service valve ☐ ☐ ☐ _____
- 5) Maintenance access ☐ ☐ ☐ _____
- 6) Detail drawing ☐ ☐ ☐ _____

11.4.1

Riser Entrance (details)

- 1) Protective coatings ☐ ☐ ☐ _____
- 2) Cathodic protection ☐ ☐ ☐ _____
- 3) pH/resistivity survey ☐ ☐ ☐ _____
- 4) Appropriate connections ☐ ☐ ☐ _____

11.4.2 Erosion Control

Yes No N/A Rev.Cmt.

11.5.0 Sewerage and Drainage Systems

- 1) Basewide connection ☐ ☐ ☐ _____
- 2) Roofs to drywells ☐ ☐ ☐ _____
- 3) Parking o/w separator ☐ ☐ ☐ _____
- 4) Separate seepage pit ☐ ☐ ☐ _____
- 5) IWW collection ☐ ☐ ☐ _____

11.5.1

Oil Water Separators

- ☐ ☐ ☐ _____

11.6.0 Natural Gas Distribution

- 1) Proper pressure ☐ ☐ ☐ _____
- 2) Code conformity ☐ ☐ ☐ _____
- 3) Diameter ☐ ☐ ☐ _____
- 4) Proper line sizing ☐ ☐ ☐ _____
- 5) Proper welds ☐ ☐ ☐ _____
- 6) No sunlight ☐ ☐ ☐ _____
- 7) Steel above grade ☐ ☐ ☐ _____
- 8) Proximity to utilities ☐ ☐ ☐ _____
- 9) Proper signage ☐ ☐ ☐ _____
- 10) Tracing at valves ☐ ☐ ☐ _____
- 11) Protection ☐ ☐ ☐ _____
- 12) Curb shut-off ☐ ☐ ☐ _____
- 13) Proper signage ☐ ☐ ☐ _____
- 14) Valve conformity ☐ ☐ ☐ _____
- 15) Proper installation ☐ ☐ ☐ _____
- 16) Leakage detection ☐ ☐ ☐ _____

CHAPTER 11 – CIVIL DESIGN CHECKLIST

	Yes	No	N/A	Rev.Cmt.
11.6.1 Gas Meters				
1) Each facility inclusion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Cabinet inclusions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Cabinet location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Cabinet venting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Cabinet grounding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Cabinet foundation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8) Concrete base	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9) Proper welds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
10) Proper transitions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
11) Gas train	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
11.7.1				
Water Storage Tanks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
11.7.2 Fuel Oil Storage				
1) Standard conformity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Alarm/protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Fuel line location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Lock/alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Gauge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Day tank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Specifications met	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8) Italian standards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
11.8.0 Roads, Parking Lots, Sidewalks				
1) Curb/gutter inclusion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Material/construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Adequate docking areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Exterior storage paving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Sidewalk construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

CHAPTER 12 – STRUCTURAL DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

12.2.0

General Design Criteria

☐ ☐ ☐ _____

12.2.1 Design Loads

- 4) Italian standards ☐ ☐ ☐ _____
 5) ASCE evaluation ☐ ☐ ☐ _____

12.2.2

Soil Profile (study)

☐ ☐ ☐ _____

12.2.3

Subsoil Conditions (testing)

☐ ☐ ☐ _____

12.2.4

Water Table Depth (verify)

☐ ☐ ☐ _____

12.2.5 Frost Depth

- 1) Foundation depths ☐ ☐ ☐ _____
 2) Risk elimination ☐ ☐ ☐ _____

12.3.0 Structural Systems

- 1) Dod/Govt. compliance ☐ ☐ ☐ _____
 2) Standard conformity ☐ ☐ ☐ _____
 3) System evaluation ☐ ☐ ☐ _____

12.4.0 Foundations

- 1) Concrete strength ☐ ☐ ☐ _____
 2) Appropriate construction ☐ ☐ ☐ _____
 3) Minimize settling ☐ ☐ ☐ _____

12.4.1 Geotechnic Report

- 1) Foundation systems ☐ ☐ ☐ _____
 2) Soil characteristics ☐ ☐ ☐ _____
 3) Earth pressures ☐ ☐ ☐ _____
 4) Shear strength ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

- 5) Sub-grade preparation ☐ ☐ ☐ _____
 6) Existing problems ☐ ☐ ☐ _____
 7) Drainage issues ☐ ☐ ☐ _____
 8) Inspection ☐ ☐ ☐ _____
 9) Seismic parameters ☐ ☐ ☐ _____
 10) Define frost depth ☐ ☐ ☐ _____
 11) Concrete recommend. ☐ ☐ ☐ _____

12.5.0 Floor Slabs

- 1) Concrete specifications ☐ ☐ ☐ _____
 2) Sub-base specifications ☐ ☐ ☐ _____
 3) Slab clearance ☐ ☐ ☐ _____
 4) Radon ventilation ☐ ☐ ☐ _____
 5) Modular system ☐ ☐ ☐ _____

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CHAPTER 13 – MECHANICAL DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

13.2.0 General Guidelines

- 1) Maximize features ☐ ☐ ☐ _____
- 2) Conceal distribution ☐ ☐ ☐ _____
- 3) Boiler room codes ☐ ☐ ☐ _____
- 4) Provide documentation ☐ ☐ ☐ _____

13.2.1 Operating and Maintenance

- 1) Clear accessible space ☐ ☐ ☐ _____
- 2) 1 year tools and parts ☐ ☐ ☐ _____
- 3) Duplicate manuals ☐ ☐ ☐ _____
- 4) Manual storage ☐ ☐ ☐ _____
- 5) Training in specifications ☐ ☐ ☐ _____

13.3.1 Backflow Prevention

- 1) Appropriate placement ☐ ☐ ☐ _____
- 2) Check valves ☐ ☐ ☐ _____
- 3) Drawing inclusions ☐ ☐ ☐ _____
- 4) ½"-4" selection ☐ ☐ ☐ _____
- 5) > 4" selection ☐ ☐ ☐ _____
- 6) Code compliance ☐ ☐ ☐ _____
- 7) Pressure principle ☐ ☐ ☐ _____

13.3.2 Floor Drains

- 1) No industrial location ☐ ☐ ☐ _____
- 2) Above ground collection ☐ ☐ ☐ _____
- 3) Domestic connections ☐ ☐ ☐ _____

13.3.3 Holding Tanks

- 1) Adequate capacity ☐ ☐ ☐ _____
- 2) Adequate provision ☐ ☐ ☐ _____
- 3) Appropriate location ☐ ☐ ☐ _____
- 4) Verification of reqts. ☐ ☐ ☐ _____
- 5) Drywell as allowed ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

6) Off-base pumping as required

- ☐ ☐ ☐ _____

13.3.4 Water Softeners

- 1) Hardness level ☐ ☐ ☐ _____
- 2) Volumetric ☐ ☐ ☐ _____
- 3) Required inclusions ☐ ☐ ☐ _____
- 4) High capacity ☐ ☐ ☐ _____
- 5) Low capacity ☐ ☐ ☐ _____

13.3.5 Cold Water Distribution

- 1) Pipes segregated ☐ ☐ ☐ _____
- 2) Electrical proximity ☐ ☐ ☐ _____

13.3.6 Hot Water Distribution

- 1) Minimum temperature ☐ ☐ ☐ _____
- 2) Gas as possible ☐ ☐ ☐ _____
- 3) Anti-scald at source ☐ ☐ ☐ _____
- 4) Insulate all ☐ ☐ ☐ _____
- 5) Proximity to end use ☐ ☐ ☐ _____
- 6) Required locations ☐ ☐ ☐ _____

13.3.7 Toilets

- 1) Flow limiting devices ☐ ☐ ☐ _____
- 2) Internal overflows ☐ ☐ ☐ _____
- 3) Urinal control ☐ ☐ ☐ _____
- 4) Mixers taps ☐ ☐ ☐ _____
- 5) Backflow at sink ☐ ☐ ☐ _____
- 6) Appropriate fixtures ☐ ☐ ☐ _____
- 7) Shower controls ☐ ☐ ☐ _____
- 8) All fixtures white ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

13.3.8 Drinking Fountains

- 1) Location and design ☐ ☐ ☐ _____
- 2) One per floor as required ☐ ☐ ☐ _____
- 3) No refrigerated units ☐ ☐ ☐ _____

13.4.0 Heating, Ventilation and Air Conditioning

- 1) Multizone ☐ ☐ ☐ _____
- 2) Individual units ☐ ☐ ☐ _____
- 3) Humidification ☐ ☐ ☐ _____
- 4) Screened from view ☐ ☐ ☐ _____
- 5) Thermostat reqts. ☐ ☐ ☐ _____
- 6) False ceiling reqts. ☐ ☐ ☐ _____

13.4.1

Seismic Design Criteria ☐ ☐ ☐ _____

13.4.2 Location of Exterior Equipment

- 1) Appropriate location ☐ ☐ ☐ _____
- 2) Louver requirements ☐ ☐ ☐ _____
- 3) Location/handler rooms ☐ ☐ ☐ _____
- 4) Exhaust location ☐ ☐ ☐ _____
- 5) Protect from elements ☐ ☐ ☐ _____

13.4.3 Penetrations at Fire Rated Walls

- 1) Pipe sleeve code reqts. ☐ ☐ ☐ _____
- 2) Fire stopping and details ☐ ☐ ☐ _____

13.4.4 Fire and Smoke Dampers

- 1) Required drawings ☐ ☐ ☐ _____
- 2) Balancing dampers ☐ ☐ ☐ _____
- 3) Access per code ☐ ☐ ☐ _____

CHAPTER 13 — MECHANICAL DESIGN CHECKLIST

	Yes	No	N/A	Rev.Cmt.
13.4.5				
Vibration Control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.4.6 Mechanical Rooms				
1) Gas as possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Detection Sensors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Stack requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Access location, size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Utility roadways, walks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Appropriate location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Adequate access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.4.7 Generator Rooms				
1) Gas as possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Leak proof	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Raised stoop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Floor penetrations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Automatic shut-off	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.4.8 Chemical Shot Feeders/Boiler and HVAC System Water Treatment				
1) Chemical shot feeders as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Water analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Manufacturer reqts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Backflow prevention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.4.9 Meters				
1) Locate as required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Code compliance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Exterior mounting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Remote monitoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Connection to Comm.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Digital controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Future/std. conformity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8) Impulse meters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

	Yes	No	N/A	Rev.Cmt.
13.5.0 Heating				
1) Heat pumps limited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Electric prohibited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Radiant/water as req'd.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Fuel oil as req'd.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Thermostatic control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Personnel temp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Warehouse temp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.6.1 Air Intakes				
1) Vertical location	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Short circuiting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Proximity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Insect screens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.6.2 Electronic Filtering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.6.3 Toilets				
1) Venting requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Adequate exhaust	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.6.4 Kitchens (exhaust)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.6.5 Industrial (compliance)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13.7.0 Air Conditioning				
1) Authorization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Personnel temperatures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Dedicated system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

CHAPTER 14 – ELECTRICAL DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

14.2.0 General Requirements

- | | | | | |
|---------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Code compliance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Certifications | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) 380/220 V distribution | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Survey data | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Power verification | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) 31 CES Coordination | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

14.2.1 Project Document Requirements

- | | | | | |
|-------------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Planimetric diagram | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Wire diagram | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Structural arrangement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Internal light calculation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) External light calculation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Thermal voltage calcs | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Cable types | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Lightning protection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 9) Ground system | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 10) Equipotential connect | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 11) Power factor calc. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 12) Discharger valuation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 13) Emergency light system | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 14) Special exterior lighting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 15) Installation description | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 16) Redundant component | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 17) Reliability/maint. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 18) Testing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

14.2.2 Meters

- | | | | | |
|----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Energy meters | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) EMCS Prewiring | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Mounting/telemonitoring | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Readings on-site/remote | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Yes No N/A Rev.Cmt.

- | | | | | |
|---------------------|--------------------------|--------------------------|--------------------------|-------|
| 5) Comm. connection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
|---------------------|--------------------------|--------------------------|--------------------------|-------|

14.2.3 Standby Power

- | | | | | |
|-------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Gas as possible | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Generators isolated | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Draw-out breakers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) By-pass for maint. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Fuel/tank storage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Mobile backup | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Double/disconnecting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Volt taps | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

14.2.4 Grounding

- | | | | | |
|-----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Equipment compliance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Law compliance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Dispersion system | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Dispersion connections | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) System wires | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Minimize breakers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Equipotential connection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

14.2.5 Lighting Protection System

- | | | | | |
|-------------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Adequate facility coverage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Risk analysis | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

14.2.6 Anti Surge Protection

- | | | | | |
|---------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Provide as required | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Capacitor installation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

14.2.7 Underground Electrical Work

- | | | | | |
|----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Ductbanks with manholes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Above/below ground | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Yes No N/A Rev.Cmt.

14.3.0 Primary and Secondary Power Distribution

- | | | | | |
|------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) MV requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) LV requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Physical protection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

14.4.0 Substations and Switchgear

- | | | | | |
|-----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Adequate protection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Coord. with existing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Proper switchgear equip. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Proper MV switchgear | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Transformer reqts. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) LV substation switchgear | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) LV bldg. panels | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Proper LV switchgear | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 9) Proper circuit breakers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 10) Panels as authorized | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 11) LV switchgear reqts. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 12) Volt taps. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 13) Expansion consid. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 14) Emergency lighting | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 15) Lawful grounding | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

14.4.1 MV/LV Substation Equipment

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) MV characteristics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) MV/LV characteristics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) LV characteristics | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

14.5.1

Seismic Design Criteria

- | | | | |
|--------------------------|--------------------------|--------------------------|-------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
|--------------------------|--------------------------|--------------------------|-------|

14.5.2 Panelboards

- | | | | | |
|-----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Appropriate housing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Specification compliance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Authorized panels | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

CHAPTER 14 — ELECTRICAL DESIGN CHECKLIST

	Yes	No	N/A	Rev.Cmt.
14.5.3 Wiring				
1) Adequate provisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Minimum requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Shield cables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Cable trays	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Expansion consideration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) IMQ mark	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Certified connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8) Testing equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.5.4 Conductor Sizes				
1) Lighting main	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Lighting branch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Outlet distribution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Outlet branch	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Control circuit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Pipe diameter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.5.5 Outlets				
1) Standard details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Appropriate installation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Mounting height	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Wet location reqts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Special outlet approval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) 120V requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) 120 w/transformers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8) 220V requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9) Special purpose	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
10) General purpose specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
11) Computer outlet reqts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
12) Domestic/admin. spcng.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13) Corridor spacing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14) Code compliance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.5.6 Accessibility for Disabled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.6.0 Lighting				
1) Security locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

	Yes	No	N/A	Rev.Cmt.
2) Appropriate sensors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Indirect where required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Minimal incandescent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) No sulphur systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Parking/outdoor reqts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.6.1 Illumination Ratings for Fluorescent Lamps				
1) Specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) No mercury vapor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.6.2 Lighting Fixtures				
1) Minimum requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Recessed specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Wet specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Indirect specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Task requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Grouped switching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Restroom switches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8) Emergency system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9) Exit specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
10) High bay areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
11) External specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
12) Walkway specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13) Decorative specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14) Parking/street specs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
15) Small area reqts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.7.1 Software and Hardware	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.7.2 Connection from the Buildings to the Electric Substation				
1) Dedicated cables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Rack requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Analyzer/meter as req'd.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Meter specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Racks at substations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.7.3 System Characteristics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

	Yes	No	N/A	Rev.Cmt.
14.7.4 System Functions				
1) Current, value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Current, peak	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Line voltages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Power factor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) Instantaneous power	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Maximum power	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7) Frequency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
8) Active/reactive power	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
9) Alarm/fault	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
10) Analogic variable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
11) Gas measurements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
12) Water measurements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13) Printout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14) Measurement precision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.7.5 System Structure				
1) Monitor requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Module requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Short-circuit avoidance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Remote control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
5) UPS units	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
6) Backup requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.7.6 Server Station				
1) Data control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Capability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.7.7 Alarm management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.7.8 System access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14.7.9 System Software				
1) Remote monitoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
2) Open type	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
3) Software parameters	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
4) Dataflow programming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

CHAPTER 15 – COMMUNICATIONS SYSTEMS DESIGN CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

15.2.1 Manholes and Ductbanks

- | | | | | |
|---------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Minimum requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Conduit specifications | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Ductbank system | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Manhole specifications | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

15.2.2 Cable-Copper

- | | | | | |
|---------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Copper telephone cable | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Base cable counts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Surge protection | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Standard compliance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Appropriate connectors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Splice specifications | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

15.2.3 Cable-Fiber Optical

- | | | | | |
|---------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) FOC installation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Connect/terminate | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Fiber run requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Standard compliance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

15.3.0 Internal Communication Distribution and Wiring

- | | | | | |
|---------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Industry std. solution | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) CAT-5e specifications | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Separation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Outlet connections | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Voice/data drops | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Cable termination | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) CAT-5e termination | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

Yes No N/A Rev.Cmt..

15.4.0 Communications Room

- | | | | | |
|----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Minimum provisions | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Earth ground | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Power distribution | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Climate control | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) Rack requirements | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 6) Access design | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 7) Classified coordination | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 8) Termination reqts. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

15.5.0

CATV (prewired)

- | | | | |
|--------------------------|--------------------------|--------------------------|-------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
|--------------------------|--------------------------|--------------------------|-------|

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CHAPTER 16 – ENVIRONMENTAL STANDARDS CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

16.1.1 Contaminated / Archaeological Site Excavation

- 1) Permit ☐ ☐ ☐ _____
- 2) Stoppage if findings ☐ ☐ ☐ _____

16.1.2 Water Distribution Disinfection

- 1) Analysis ☐ ☐ ☐ _____

16.1.3 Ozone Depleting Chemicals

- 1) No Class 1 ODC ☐ ☐ ☐ _____
- 2) R407 mix for A/C ☐ ☐ ☐ _____
- 3) MSDS ☐ ☐ ☐ _____

16.1.4 Insulation Materials

- ☐
- ☐
- ☐
- _____

16.1.5 Lighting

- 1) Energy efficiency ☐ ☐ ☐ _____
- 2) Photoelectric cells ☐ ☐ ☐ _____
- 3) Industrial lighting ☐ ☐ ☐ _____

16.1.6 Heating System Fuel (gas)

- ☐
- ☐
- ☐
- _____

16.1.7 Spills

- 1) Appropriate notification ☐ ☐ ☐ _____
- 2) Fire department contact ☐ ☐ ☐ _____

16.2.0 Sound Attenuation

- 1) Sources addressed ☐ ☐ ☐ _____
- 2) Verify sound levels ☐ ☐ ☐ _____
- 3) STC minimum 45 ☐ ☐ ☐ _____
- 4) Materials/openings ☐ ☐ ☐ _____
- 5) Work centers 70 dBA ☐ ☐ ☐ _____
- 6) Admin. at center ☐ ☐ ☐ _____
- 7) Isolate generators ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

16.3.0 Radon Mitigation

- 1) Criteria included ☐ ☐ ☐ _____
- 2) Design selection ☐ ☐ ☐ _____

16.4.0

Drainage Sys. (discharge)

- ☐
- ☐
- ☐
- _____

16.4.1 Sanitary Sewer

- 1) Regulation septic tank ☐ ☐ ☐ _____
- 2) Manhole for future ☐ ☐ ☐ _____
- 3) Flow limitation ☐ ☐ ☐ _____
- 4) Backflow device ☐ ☐ ☐ _____
- 5) Sewer runoff ☐ ☐ ☐ _____
- 6) Separation ☐ ☐ ☐ _____
- 7) Segregation ☐ ☐ ☐ _____

16.4.2 Parking Lots

- 1) Oil/water separator ☐ ☐ ☐ _____
- 2) Separator quality ☐ ☐ ☐ _____
- 3) O&M maintenance ☐ ☐ ☐ _____

16.4.3 Vehicle Washing Facilities

- 1) Closed loop system ☐ ☐ ☐ _____
- 2) Protection as required ☐ ☐ ☐ _____

16.4.4 Floor Drains

- 1) Prohibited locations ☐ ☐ ☐ _____
- 2) Collection/discharge ☐ ☐ ☐ _____
- 3) Sewer connection ☐ ☐ ☐ _____

16.5.0

Solid Waste Materials

- ☐
- ☐
- ☐
- _____

Yes No N/A Rev.Cmt.

16.6.1 Construction Waste

- 1) Lawful compliance ☐ ☐ ☐ _____
- 2) Materials listing ☐ ☐ ☐ _____
- 3) Waste management plan ☐ ☐ ☐ _____
- 4) No EPA 17 toxins ☐ ☐ ☐ _____

16.6.2

Industrial Waste (storage)

- ☐
- ☐
- ☐
- _____

16.6.3 Asbestos

- 1) Regulation compliance ☐ ☐ ☐ _____
- 2) Stoppage if findings ☐ ☐ ☐ _____

16.6.4

Paints (non-lead based)

- ☐
- ☐
- ☐
- _____

16.6.5 Petroleum, Oils and Lubricants Storage

- 1) Double-walled storage ☐ ☐ ☐ _____
- 2) Leak/overflow safeguards ☐ ☐ ☐ _____
- 3) Fuel line installation ☐ ☐ ☐ _____
- 4) Points lockable/alarm ☐ ☐ ☐ _____
- 5) Fuel gauge ☐ ☐ ☐ _____
- 6) Adequate transfer pumps ☐ ☐ ☐ _____
- 7) Policy/specification ☐ ☐ ☐ _____

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CHAPTER 17 – GENERAL PROVISIONS FOR CONSTRUCTION CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt.

17.1.0 Contractor General Requirements

- 1) Access route ☐ ☐ ☐ _____
- 2) Storage area ☐ ☐ ☐ _____
- 3) Construction fence ☐ ☐ ☐ _____
- 4) Security ☐ ☐ ☐ _____

17.1.1 Ground Safety

- 1) Lawful compliance ☐ ☐ ☐ _____
- 2) Regulations ☐ ☐ ☐ _____

17.2.0 Existing Site Conditions

- 1) Coordinate w/ planner ☐ ☐ ☐ _____
- 2) Existing conditions ☐ ☐ ☐ _____
- 3) 48 Hour response time ☐ ☐ ☐ _____
- 4) Complete site survey ☐ ☐ ☐ _____
- 5) Reconnect interruptions ☐ ☐ ☐ _____
- 6) Boring care/restoration ☐ ☐ ☐ _____
- 7) Tree protection/restoration ☐ ☐ ☐ _____
- 8) Grass requirements ☐ ☐ ☐ _____
- 9) Topsoil re-use ☐ ☐ ☐ _____

17.3.0 Site Restrictions (full compliance)

- 1) Work area ☐ ☐ ☐ _____
- 2) Security norms ☐ ☐ ☐ _____
- 3) Access areas ☐ ☐ ☐ _____
- 4) Special area entrance ☐ ☐ ☐ _____
- 5) Restricted access ☐ ☐ ☐ _____
- 6) Secrecy laws ☐ ☐ ☐ _____
- 7) Work stoppage ☐ ☐ ☐ _____
- 8) Work interruption ☐ ☐ ☐ _____
- 9) Bilingual signage ☐ ☐ ☐ _____
- 10) Obstruction lights ☐ ☐ ☐ _____
- 11) Loading/unloading ☐ ☐ ☐ _____
- 12) Site triangles ☐ ☐ ☐ _____
- 13) Parking ☐ ☐ ☐ _____
- 14) Area protection ☐ ☐ ☐ _____
- 15) Fence restricted areas ☐ ☐ ☐ _____
- 16) Storage fencing ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

- 17) Temporary bridging ☐ ☐ ☐ _____
- 18) Circulation ☐ ☐ ☐ _____

17.4.1 Sanitary Sewer

- 1) Disposal by Contractor ☐ ☐ ☐ _____
- 2) Imhof usage approval ☐ ☐ ☐ _____
- 3) Portable toilet facility ☐ ☐ ☐ _____

17.4.2 Water Distribution

- 1) Site connection ☐ ☐ ☐ _____
- 2) Cathodic protection ☐ ☐ ☐ _____
- 3) 31AMDS coordination ☐ ☐ ☐ _____

17.4.3 Electrical Service

- 1) Site connection ☐ ☐ ☐ _____
- 2) Generator as required ☐ ☐ ☐ _____
- 3) Code compliant panels ☐ ☐ ☐ _____

17.4.4 Utility Outages

- 1) 4 hour limit ☐ ☐ ☐ _____
- 2) Outage time constraints ☐ ☐ ☐ _____
- 3) Temporary power ☐ ☐ ☐ _____
- 4) Temporary substations ☐ ☐ ☐ _____
- 5) Lockout/tagout ☐ ☐ ☐ _____
- 6) Tag provisions ☐ ☐ ☐ _____

17.4.5 Fire Protection Systems

- 1) Base coordination ☐ ☐ ☐ _____
- 2) Testing/certification ☐ ☐ ☐ _____

17.5.0 Construction Debris Disposal

- 1) Site cleanliness ☐ ☐ ☐ _____
- 2) Waste removal ☐ ☐ ☐ _____
- 3) Special dumpsters ☐ ☐ ☐ _____
- 5) Debris disposal ☐ ☐ ☐ _____
- 6) Reclaimable requirements ☐ ☐ ☐ _____
- 7) Material disposal ☐ ☐ ☐ _____

17.6.0 Master Keying

- 1) System as required ☐ ☐ ☐ _____

Yes No N/A Rev.Cmt.

- 2) Uniform keying ☐ ☐ ☐ _____
- 3) Key specifications ☐ ☐ ☐ _____
- 4) Approval as required ☐ ☐ ☐ _____

17.7.0 Color Board Submittals

- 1) Board as required ☐ ☐ ☐ _____
- 2) Presentation ☐ ☐ ☐ _____
- 3) Inclusions ☐ ☐ ☐ _____
- 4) Review submittal ☐ ☐ ☐ _____

17.8.0 Authorizations

- 1) Permits ☐ ☐ ☐ _____
- 2) Italian authorizations ☐ ☐ ☐ _____
- 3) Restricted area access ☐ ☐ ☐ _____
- 4) Waivers as required ☐ ☐ ☐ _____
- 5) Area F coordination ☐ ☐ ☐ _____

17.8.1

Non-Standard Workdays

☐ ☐ ☐ _____

17.8.2

Season Limitations

☐ ☐ ☐ _____

17.8.3

Digging Permits (approval)

☐ ☐ ☐ _____

17.8.4 Flammable and Toxic Substance Storage (method and tracking)

☐ ☐ ☐ _____

17.8.5

Open Flame Operations

☐ ☐ ☐ _____

17.9.0 Tests and Certifications

- 1) 2 copies of results ☐ ☐ ☐ _____
- 2) Lawful compliance ☐ ☐ ☐ _____

17.9.1 Water Supply Analysis

- 1) Test prior to acceptance ☐ ☐ ☐ _____
- 2) Minimum testing ☐ ☐ ☐ _____

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CHAPTER 18 – CADD / GIS DRAWING STANDARDS CHECKLIST

Project Number	Project Title	Submitting Firm	Base
Project Manager	Telephone Number	Email	Date
Type of Review (Mark X where applicable): <input type="checkbox"/> Conceptual <input type="checkbox"/> Schematic <input type="checkbox"/> Design Development <input type="checkbox"/> Final			

Yes No N/A Rev.Cmt..

18.1.0 Contract Drawings

- | | | | | |
|-------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Digital format | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Submittal format | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Data standards | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Production standards | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

18.2.0

Drawings (standards) ☐ ☐ ☐ _____

18.3.0 Drawing Cover Sheet and Title Block

- | | | | | |
|---------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Base map | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Review signature block | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Title block | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

18.4.0 Drawing Format and Document Sequence

- | | | | | |
|----------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Preliminary sketch plan | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Final sketch plan | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Working Drawings | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Working drawings | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

18.4.1 Additional Submittals

- | | | | | |
|-----------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) Reproducible mylar | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) Specifications | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 3) Color board | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 4) Digital format | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 5) CD ROM/diskette | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

18.5.0 Geographical Information System

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|-------|
| 1) ESRI shapefile format | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 2) ARC VIEW(ing) capable | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |